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POPULAR AND PRACTICAL ENTOMOLOGY.

THE COTTONWOOD LEAF-MINING BEETLES IN SOUTHERN ALBERTA.

BY E. H. STRICKLAND,
Entomological Branch, Dominion Dept. of Agriculture.

Cottonwoods and other poplars have proved to be the trees best adapted for shade and ornamental purposes on the treeless plains of Southern Alberta and Saskatchewan. It is, therefore, to be regretted that every year the leaves of these beautiful trees are made unsightly by the presence of large blackened areas, which may extend over their entire surface. In some years hardly a leaf on badly attacked trees escapes this disfigurement.

By the middle of June an examination of the cottonwood trees around Lethbridge, Alberta, can hardly fail to reveal the presence of small groups of holes on the underside of the leaves, (Fig. 2) with perhaps a few smaller groups on the upper side also (Fig. 1, A).

A closer examination of these holes shows that they are never more than about 1 mm. in diameter and are polygonal in shape, being bounded by the finer reticulations of the leaf veins. They do not entirely pierce the leaf but extend to the upper epidermis, which appears as a transparent membrane when the leaf is held to the light. After a few weeks they become more circular in outline, and are surrounded with a cork-like growth.

These holes are the feeding punctures of the Cottonwood and the Poplar-leaf-mining beetles (*Zeugophora scutellaris* Suffr. and *Z. abnormis* Lec.).

The former beetle, which we shall consider more especially in this article, is a pretty little species, measuring 4 mm. long, with a bright yellow thorax and with black wing covers. (Fig. 3). This beetle feeds most abundantly on cottonwoods, though it is found sparingly on other poplars.

Weiss and Nicolay* in recording the occurrence of this beetle in New Jersey, where they state that it appeared first in 1919, describe it as a "European Poplar Leaf-miner." We are inclined to doubt whether this species has been imported from Europe. Mr. Criddle tells me that, from the earliest dates upon which he made observations on the cottonwood-infesting insects of Manitoba this beetle has been abundant, especially upon the native cottonwoods in river bottoms. This observation was made in 1903, when very few cottonwoods had been imported into Manitoba from elsewhere, and Mr. Criddle has noticed that the beetles do not spread rapidly to the imported trees. In Alberta our first personal record was made in 1913, but the inhabitants of Lethbridge informed us at the time that, in so far as they had observed, the cottonwood leaves were always more or less disfigured with black blisters.

Zeugophora abnormis is a beetle similar in size to *Z. scutellaris*, but it is entirely black. It is rarely seen on cottonwoods, but it confines its attention chiefly to Balms of Gilead.

*Ento. News, vol. 30, May, 1919.

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Life-history and Habits of Z. scutellaris, Suffr.

On about June 15, the adults are found for the first time in the year feeding on cottonwood leaves. From then on to the end of the month their numbers increase rapidly. Although these beetles are apparently strong fliers they do not take readily to wing, but if disturbed they fall to the ground, feigning death. They are usually present in the largest numbers on the smaller leaved varieties of cottonwoods, and are always more numerous on the lee side of the tree than on the exposed. Trees sheltered by houses also suffer more than others.

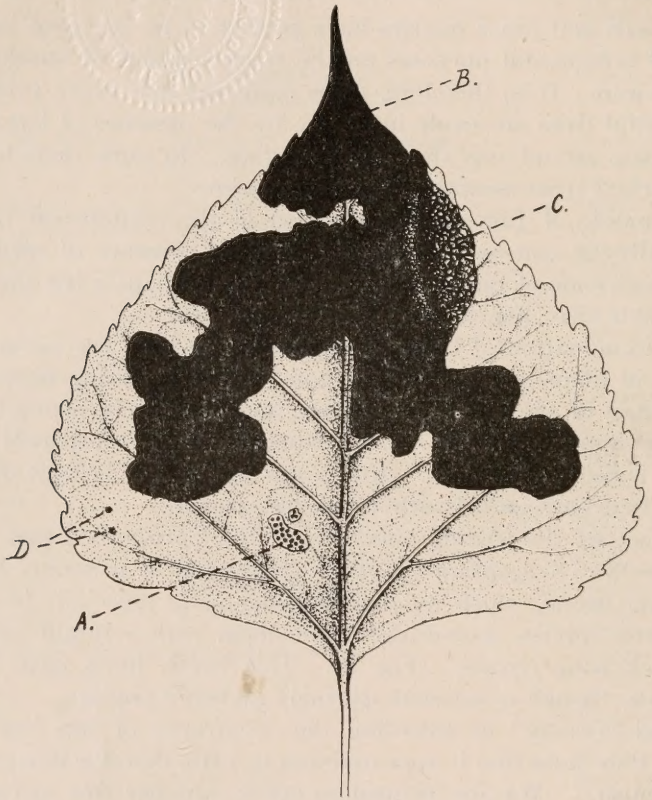

Fig. 1. Cottonwood leaf, upper side, attacked by *Z. scuiellaris*, natural size.
A. Old feeding punctures of adult.
B. Blackened blister made by larva.
C. Epidermis torn away where larva escaped.
D. Darkened areas over eggs which failed to hatch.

By June 26, the sexes are mating freely on the leaves, the female browsing peacefully meanwhile. Before the end of the month numerous eggs can be found in the leaves of trees where the beetles have been feeding. These eggs are yellow or green in colour, elliptical, 1 mm long by 5 mm wide. They are laid in a small cavity close to the upper epidermis of the leaf. This is connected to a hole on the underside of the leaf by a short diagonal tunnel.

Soon after the egg has been laid the tissues above the cavity turn brown, thus the location of each egg is marked on the upper side of the leaf by a small brown spot about 1 mm in diameter (Fig. 1, D).

From the egg hatches a small, flat larva with a broad head, flattened dorso-

ventrally to such an extent that its anterior margin has a chisel-like edge, from which project a pair of sharp mandibles. (Fig. 4.)

The young larva is very delicate, but it begins at once to enlarge the cavity in which it hatched, feeding only on the palisade cells of the leaf just under the upper epidermis Throughout its life the larva feeds on these cells only and never attacks the lower layer of cells forming the spongy tissues of the leaf. These latter turn black about 24 hours after the overlying layer of palisade cells have been eaten, and this black colour showing through the transparent upper epidermis causes the unsightly disfigurement of attacked leaves, as shown in Fig. 1, B.

The larva is unable at first to eat through the larger veinlets, but the eggs are always laid within half an inch of the leaf margin, where the veins are very fine, thus assuring an ample food supply before the larva is strong enough to tackle the larger veins, the mid-rib of which will in time be eaten through. Often several eggs are laid in one leaf, in one case as many as 13 were counted, but a large percentage fail to hatch. The larvæ are by no means gregarious.

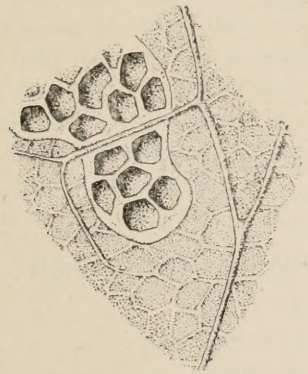

Fig. 2. Old feeding punctures on under side of leaf showing corky tissues developed around punctured area.

Fig. 3. Adult of *Z. scutellaris*, x 7.

When the burrows of two larvæ of approximately equal size join up, these two larvæ may both live if they remain in different areas of the single blister thus formed, but in nearly every case only one survives A large blister covering almost an entire leaf frequently contains one healthy larva only, together with six or seven smaller dead specimens which show no apparent cause for death.

The larvæ are found with the ventral side uppermost. They are legless, and can move as readily on the dorsum as on the venter. While in the blister they are very active and can move rapidly, but when removed from it their progress is very slow

In figure 4 we illustrate a larva of this species in the penultimate stage. The characteristic black markings on the meso- and meta-thoracic and on the abdominal segments are present in all stages of this larva, with the exception of the first and the final stages. They occur both on the dorsum and venter.

By the middle of September the majority of larvæ are mature, measuring 6 mm long. They now break through the thin upper epidermis of the leaf (Fig 1 C) and fall to the ground.

In captivity the escaped larva burrows into the soil to the depth of about 4

inches, where it forms a small elliptical cavity about 1/16″ long by 1/2″ wide, in which it is found curled up, probably to hibernate as a larva. These cells with their contained larvæ could not be found under infested trees, the majority of which were growing on lawns. Captive specimens were alive and active when distributed on the 12th of November, but were all dead when examined in the following spring.

Life-history and Habits of Z. abnormis Lec.

As previously stated, this is found most abundantly on Balm of Gilead.

Its life-history does not differ much from that given above, though eggs are laid in much larger numbers on individual leaves, as many as 50 having been taken from one leaf. About 28% of the eggs under observation failed to hatch for no apparent reason, and an examination of leaves under natural conditions indicated that this sterility was normal.

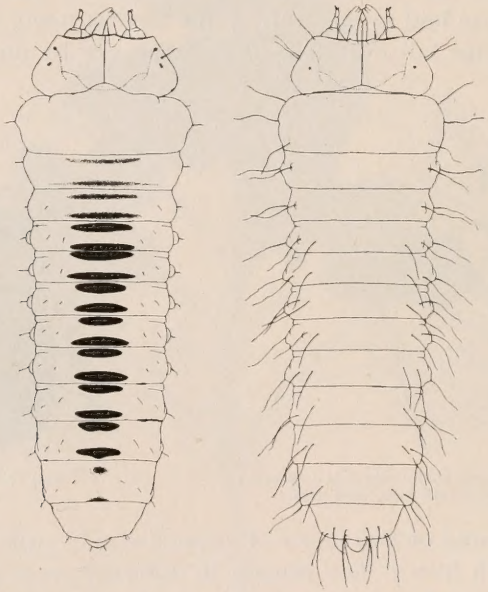

Fig. 4. Larvæ of *Z. scutellaris* and *Z. abnormis*, x 10.

The larvæ are similar to those of *scutellaris*. The main structural differences as shown in Fig. 4, which represents an almost mature larva of each species. Stage II larvæ of *abnormis* have black abdominal markings similar to, though less prominent than, those of *scutellaris*, but from stage III onwards they are entirely missing, and the larva is of a uniform yellowish-green colour.

These larvæ are more gregarious than are those of *scutellaris*, and as many as seven healthy specimens in various stages have been found feeding together in one blister.

The adults attack sheltered trees almost exclusively. The greatest damage is done to foliage 6 to 10 feet from the ground, while the leaves towards the centre of the tree are almost immune from attack.

Though this beetle does not occur annually in such large numbers as does *scutillaris*, it is far more abundant in some years on the comparatively few

Balms of Gilead than is that species. Attacked trees may have the majority of leaves almost completely veined by the feeding of the adults alone.

Control.

Natural.—Egg parasites are numerous, particularly in *Z. abnormis*. A minute Hymenopterous fly was reared from attacked eggs, which has been determined as a Mymarid. Over 40 per cent. of the eggs of *abnormis* examined contained various stages of this parasite.

One specimen of a hymenopterous parasite only was found in large numbers of larvæ examined.

Artificial.—Experiments in spraying infested trees with Lead Arsenate or Paris Green indicated that the latter would prove more successful. It is a more rapid killer, thus reducing oviposition by the females after feeding on it.

The following spray gave good results; Paris green, 1 oz.; slack lime, 4 oz.; water, 10 gallons. Care must be taken that the spray is directed to the underside of the leaves, which necessitates the use of an angle nozzle, and the work must be done as soon as the beetles appear in sufficient numbers to indicate that the trees will suffer later in the season.

It is useless to spray with Paris green when the leaves begin to turn black. The spraying of only a few trees, however well done, in a badly infested area can at best diminish by a small amount the attack on those particular trees. This is due to the flying ability of the beetles. Were the majority of the trees in the district sprayed early in the season most of the beetles would be poisoned while they were feeding on various trees before selecting leaves for oviposition towards the end of June.

THREE NEW CRANE-FLIES FROM EASTERN CANADA.

BY DR. W. G. DIETZ,
Hazleton, Pa.

Late in the fall of 1917, I received from Dr. A. G. Huntsman, Curator of the Atlantic Biological Station, St. Andrews, N.B., a small collection of crane-flies, taken by him at Eastern Harbour, Cape Breton Island, N.S., and Amherst Island, Magdalen Islands, Que. Aside from the three species here described as new, the following species were represented:—*Limnophila inornata* O. S., Eastern Harbour, July 1st, 7 ♂'s; *Limnophila adusta* O. S., Eastern Harbour, July 4, 1 ♀; *Pachyrina pedunculata* Loew, Eastern Harbour, July 1st, 1 ♂; *Pachyrina ferruginea* Fabr., Amherst Is., July 15; Eastern Harbour, July 20, 5 ♂'s, 2 ♀'s; *Tipula angulata* Loew, Eastern Harbour, July 1st, 1 ♂, 2 ♀'s; *Tipula trivittata* Say, Amherst Is., July 15, 1 ♂; *Tipula caloptera* Loew, Eastern Harbour, July 1st, 1 ♀; *Tipula latipennis* Loew (*ottawaensis* Dietz), Amherst Is., July 15, 1 ♂; *Tipula rohweri* Doane, Amherst Is., July 12, 1 ♂; *Tipula inermis* Doane, Amherst Is., July 15, 2 ♂; and *Tipula tephrocephala* Loew, Eastern Harbour, July 1st, 1 ♂, 2 ♀'s.

Limnophila magdalena, n. sp.*

Black with a grayish bloom. Very similar to *Limnophila barberi* Alex. Legs dusky yellow, femora infuscate at apex only.

*Types of the new species are in the author's collection.

Male.—Length 10 mm.; wing 10 mm. Head, mouth-parts, palpi and antennæ black; rostrum short; antennæ short, first joint long with grayish bloom above, second joint broadly subconic, joints three to five a little wider than the following joints and, like the latter, moniliform, outer joints somewhat elongate; the whole antennæ thinly clothed with short, black hairs, shorter than the respective joints. Front and occiput with a grayish bloom and, especially the latter, beset with black hairs. Neck three-quarters the length of front and occiput, transversely subrugulose.

Thorax concolorous, subglabrous; the usual stripes are subfoveate, the median stripe of equal width with an irregular, grayish median line; the interspaces with grayish bloom and a row of short, grayish hairs, directed outwardly; the grayish bloom is more dense on the posterior portion of the præscutum, so as to obscure the limitations of the stripes. Scutum, scutellum and postnotum with grayish bloom. Pleura with grayish bloom, dorso-pleural membrane obscurely yellowish. Halters entirely pale, yellowish. Legs of moderate length and robustness, sordid yellow with black pilosity; coxæ yellowish-brown, darker anteriorly; anterior and middle femora infuscate in apical fifth the posterior in the apical fourth; apices of tibiæ and outer tarsal joints infuscate. Wings light brownish, costal portion more yellowish; veins brown, cord and vein *Cu*, Cu_2 and A_2 seamed with brown; Sc_2 on a line with the base of cell R_2; *Rs* long, slightly curved at its base, R_{2+3} very short, scarcely longer than Sc_2, cross-vein *r* at the tip of R_1; the bases of cells R_{2+3} and R_{4+5} approximately in a line, cell M_1 about as long as its petiole; basal deflection of *Cu*, near the middle of cell *1st* M_2; stigma elongate, quadrate, dark brown.

Abdomen dark brown; tergites two to four, somewhat reddish in the middle portion and thinly clothed with whitish hair. Hypopygium concolorous; the ninth tergite strongely narrowed posteriorly with a small, rounded median emargination. Pleurites large, hairy; the upper appendages dark testaceous, broadening for three-fifths their length, thence narrowed and ending in a dentiform point, the inner margin of the outer two-fifths strongly denticulate; the lower appendage broad in basal portion, and ending in a sharp point.

Holotype.—♂, Amherst Island, Magdalen Islands, Quebec, July 15th, 1917. (A. G. Huntsman).

Distinguished from *L. barberi*, which appears to be its nearest ally, by its larger size, brownish wings, dark brown stigma and veins *Cu* and Cu_2 strongly seamed with fuscous. The front femora are reddish-yellow, with only the apex infuscated.

Limnophila adjuncta, n. sp.

Adusta group. Dark brown, thorax shining; costal cells fuscous; stigma dark brown; apical part of wing infuscate; veins *Cu* and Cu_2 seamed with fuscous.

Length female 9.5 mm.; wing 10 mm.

Head dark fuscous, silvery-gray above; proboscis short, grayish above. Palpi brown. Antennæ short, first joint short, fuscous, joints two to five brownish-yellow, ovoidal, outer joints attenuated, brownish; pilosity of moderate length. A patch of black hair each side of occiput.

Thorax brown, shining; sides and perisutural foveæ grayish-yellow, pollinose. Scutum more distinctly pollinose. Scutellum reddish brown, shining.

Postnotum subopaque, pollinose. Pleura reddish brown, subglabrous with a faint, grayish sheen. Halters pale, club infuscate. Legs slender, sordid yellowish brown; pilosity short, grayish; coxæ and basal part of femora yellowish, tarsi fuscous. Wings light gray, costal cells fuscous, stigma elongate, dark brown, apical portion of wing infuscate, veins *Cu* and *Cu*$_2$ seamed with fuscous. Venation as in *Limnophila terræ-novæ*** Alex.

Abdomen yellowish brown, with a fine, pale pubescense; venter yellowish. Ovipositor brown, valves slender, curved upwards, apices pale.

Holotype.—♀, Eastern Harbour, Cape Breton Islands, July 17th, 1917. (A. G. Huntsman).

A very close ally of *L. terræ-novæ*, with the description of which it agrees in all points, save that the cord and cross-veins are not seamed with fuscous; the *Rs* is longer than cell *1st M*$_2$—equal in *terræ-novæ*—and subangulate at the base, with a short stump of a vein. Cell *R*$_2$ is very narrow in its basal half, whereas it widens from the base in *terræ-novæ*.

Tipula huntsmaniana, n. sp.

Very similar to *Tipula angulata* Loew. Flagellar joints of antennæ bicoloured. The pale, angulate fascia incomplete, scarcely reaching the middle of cell *M*$_3$; base of wing yellowish.

Male.—Length 13 mm.; wing 13.5 mm.

Head dull yellow; palpi yellowish brown, last joint dark brown and shorter than the preceding joints together. Frontal prolongation and rostrum concolorous, with a light, whitish pollinosity. Nasus short. Antennæ of moderate length, the three basal joints yellowish, joints three to ten yellowish, blackish at the base, outer joints brown. Frontal tubercle with impressed longitudinal line. Occiput with pale, yellowish-gray hairs.

Thorax yellowish-gray, dull. Pronotum with dark, median spot. Præscutal stripes darker brown, ill defined; the median stripe narrowed posteriorly with a not sharply limited, median paler line, scutum dull brown, posterior border paler; scutellum and postnotum luteous, with ill-defined, median darker line. Pleura yellowish white, subsericeous; pleuro-dorsal membrane dull yellow. Halters pale, club dark brown. Legs slender, dull, yellow; pilosity very short, blackish; coxæ yellowish white, sericeous; femora and tibiæ infuscate at the tip, the latter a trifle longer than the metatarsus; tarsi fuscous. Wings with the pattern of *T. angulata*, but the pale, angulate fascia becomes narrowed in cell *M*$_2$ and does not extend beyond the middle of the latter cell.

Basal tergites of abdomen yellowish, becoming yellowish brown to fuscous posteriorly, with darker, median vitta; lateral margin of tergites paler. Venter similar to tergum. Eighth sternite rounded. Hypopygium yellowish brown; ninth tergite subquadrate with U-shaped median emargination, the lateral margin of the latter ends in a sharp point. Pleural suture entire; the pleurite transversely oval, the outer appendage narrow, erect, pointed, curved somewhat backward, hairy; the inner appendages consist of perpendicular plates, broadly rounded basally, narrowed upwardly and ending just below the free margin of the ninth tergite; ninth sternite with a deep, U-shaped emargination.

**Journal New York Entomological Society, vol XXIV, Pl. 8, fig. 7.

Holotype.—♂, Eastern Harbour, Cape Breton Island, N.S., Canada. (A. G. Huntsman).

A close ally also of *Tipula entomophthorae*[1] Alex., which it resembles in hypopygial structures and from which it is differentiated in the bicolored, flagellar segments and the ill-defined, thoracic stripes. It differs from *Tipula angulata* Loew and *Tipula huron* Alex.[2], in the angulate fascia not rendering the posterior wing-margin. *Tipula texensis* Alex.[3], has the pale fascia before the stigma.

Respectfully dedicated to Dr. A. G. Huntsman.

A NEW USE FOR THE AEROPLANE.

The Department of Agriculture at Ottawa has discovered a new use for the aeroplane. The Entomological Branch is investigating the mosquito in the Lower Fraser Valley in British Columbia. By using the aeroplane, the country can be surveyed in order to map out the swampy areas and other breeding places that are readily located in photographs taken from over head, according to a statement by Dr. C. Gordon Hewitt, Dominion Entomologist, that appears in the October Agricultural Gazette. The aeroplane was used in making a comprehensive survey of the complicated water system of the Fraser River and the adjacent bodies of permanent and temporary water in that district. A flight reported by Dr. Hewitt has demonstrated the possibility of using this machine also for making surveys of timber that is being killed or has already been destroyed by various insects. Its use, it is believed, will help very greatly in the entomological work with various insects being carried on by the Federal Department of Agriculture.

THE HOUSE CENTIPEDE, CERMATIA FORCEPS RAF. IN MONTREAL.

A specimen of this Myriapod was found in a classroom of Goltman's Business College on St. Lawrence Boulevard (corner of Sherbrooke Street) on July 22, 1919, and was sent by Mr. Robert Goltman to me for the Redpath Museum where it was seen by Mr. A. F. Winn. It was kept alive feeding slightly upon house-flies until August 19th, when, by an unfortunate accident, it escaped. The species is mentioned in Comstock's Manual (p. 46) as "often found running on the walls of houses, especially in the Southern States." It was observed in Albany from 1870 onwards by J. A. Lintner, but this is believed to be the first record of its occurrence in Montreal. Lintner's account of its cleaning habits was confirmed; when cleaning the hinder limbs the body is bent sideways. The appendages of one side are cleaned in succession, beginning with the antenna.

The occurrence of this Myriapod in Canada has been recorded only once previously, a specimen having been taken in Toronto. (Can. Ent., XLVI, p. 219, 1914.) ARTHUR WILLEY.

Two other specimens of the house centipede from Toronto have been sent me to for determination since the record cited by Prof. Willey was published.

E.M.W.

1. Can. Ent., Vol. L, p. 385.
2. Ibid, Vol. L, p., 66.
3. Ibid, Vol. XLVIII, p. 48.

THE BEE GENUS EMPHOR IN SOUTH AMERICA.

BY C. SCHROTTKY,
Pto. Bertoni, Paraguay.

Mr. J. Vachal (Rev. Ent. Caen., Vol. XXVIII, p. 23, 24) cites 3 species of *Emphor* from Argentina: 1, *E. fructifer* (Holmbg.); 2, *E. tricolor* (Friese), and 3, *E. bifax* Vach. The first is at the same time the type of the genus *Teleutemnesta* Holmbg., and the second was described as an *Ancyloscelis*. Vachal himself regards *Emphor* as a subgenus of *Ancyloscelis;* but this standpoint is not to be discussed here. Changing his term "subgenus" into "genus," the question is left open whether he was correct in synonymizing *Teleutemnesta* with *Emphor*, or not. As I had the occasion to see some specimens of a representative of this group in the collection of Mr. A. de Winkelried, Bertoni, I think it useful to give a detailed description of them as well as some remarks on the group as a whole. For, if Mr. Vachal's views are correct, the genus would have a singular distribution; a few species in Argentina and one in the Eastern United States. The specimens mentioned above came from Santa Fé, Argentina, and cannot be referred to any of the three species cited by Vachal. There is a description of *Ptilothrix tricolor* (Friese) given by Brèthes* (Anal. Mus. Buenos Aires, Vol. XX, pl. 10, p. 295), based apparently on the same insect as the Santa Fé bees, but, as it seems, not on that described by Friese as *Ancyloscelis tricolor*. There are too many differences between the description of the latter and the Santa Fé bees, so these are treated here as a new species: *Emphor opuntiæ*. Surely they are at least congeneric and with the same habits as *tricolor*. Mr. A. C. Jensen Haarup states that *tricolor* "is rarer than the preceding"—*Ancyloscelis nigerrima*—"and similarly a cactus-insect" (Flora og Fauna, 1908, p. 103). According to Mr. Joergensen who observed both *tricolor* and *nigerrima* at Mendoza, Argentina, they are one and the same species; the few red hairs on the segments of *tricolor* are soon lost or decoloured and thus the insect becomes *nigerrima*. There are no plastic differences between them (Zool. Jahrb., Vol. XXIX, 1912, Abt. f. Syst. p. 157).

Joergensen says that the bee provides its nest with a tube above the soil, a behaviour not observed of any other bee from Mendoza. Among the flowers visited he likewise cites an *Opuntia* (l. c.). The North American species, *E. bombiformis* (Cress.), on the contrary, was found on flowers of *Ipomœa* and *Hibiscus*, as far as I know.

The species described by E. L. Holmberg as *Teleutemnesta fructifera* is surely also congeneric, although there seem to exist slight differences in the venation of the wings. Holmberg says that the second cubital cell is smaller than the first or third, with the first recurrent nervure a trifle behind its middle. Vachal states that the second cubital cell is almost as large as the first or third, with the first recurrent nervure between its middle and apex, nearer to its middle, however. In *opuntiæ* the second cubital cell is scarcely half the length of the first and not more than ⅔ of the third; the first recurrent nervure enters in the female almost in the middle of the cell, in the male between middle and apex. In *bombiformis* finally, the second cubital cell is described as about ⅔ the length

*Brèthes considers Emphor and part of Teleutemnesta as synonyms of Ptilothrix Sm. (Bull. Soc. Ent. France, 1910, p. 212). They are certainly related but not identical if the figures given by F. Smith are correct.

of the first. In *opuntiæ* the claws have a short median tooth in the female, a long one in the male, thus in the latter sex they appear almost cleft. In both sexes there are no pulvilli; of the other Argentine species no references are given in this respect.

Emphor opuntiæ, n. sp.

Female.—Black, 13 mm. Head as broad as thorax. Face clothed with dirty white pubescence, that on vertex black. Clypeus nude, convex, its anterior margin slightly depressed, covered not very closely with rather large punctures; its hinder margins oblique and clothed with whitish pubescence. Mandibles with fine yellowish pile at base, reaching the eyes. Vertex quite closely punctured with rather small punctures. Antennæ short, black; scape minutely punctured.

Thorax covered with grayish hairs; a transverse line of fuscous hairs behind the anterior margin of the mesonotum, with short triangular projections backwards on the parapsidal region; another transverse band of fuscous hairs on the anterior margin of scutellum. Tubercles with fuscous hairs. Sternum and lower part of pleuræ densely covered with short black hairs. Mesonotum and scutellum with quite large punctures. Basal area of propodeum almost bare, covered with fine shallow punctures and with a slight median depression at base. Enclosure of basal area smooth and shining, the rest of propodeum densily punctured. Pleuræ equally covered with close punctures.

Abdomen.—First two dorsal segments covered with very short white hairs, becoming closer and longer at sides and on apical margins, forming fasciæ which become gradually broader towards the sides; that on second segment is white only in the middle, towards the sides it becomes more and more yellowish. The following two segments are clothed at base with short scattered black hairs. the marginal fasciæ are formed by longer and closer hairs, orange-yellow and broader at sides, paler and narrower in the middle. Fifth segment only at sides with orange-yellow hairs, those at base and on apical margin fuscous. Sixth segment entirely covered with fuscous hairs, except the naked pygidial plate; this opaque, tapering towards apex, longer than broad at base. All segments punctured; the punctures small and scattered at basal segments, become gradually closer and larger towards apex. Ventral segments 2–5 with fringes of long, orange-yellow hairs; the hairs on second segment scattered, on fifth very close. Punctures on ventral segments closer at apical margins than at base.

Wings.—Subhyaline, nervures dark brown, stigma same. First cubital cell longer than third; second pentagonal, narrowed above, scarcely half the surface of first and about $\frac{2}{3}$ of third, with the first recurrent nervure a little behind its middle. Origin of cubital nervure and of first recurrent nervure equally distant from base of wing. Tegulæ almost black, microscopically punctured.

Legs.—Clothed with long, fuscous hairs. Femora dark reddish brown. Tibiæ almost black; tarsi ferrugineous. Tibial spurs reddish brown, those on posterior pair hooked at apex. Claws slender with an acute median tooth. No pulvilli.

Male.—General appearance similar to female, but larger (14 mm.), on abdomen and legs less densely haired.

Head.—Clothed with long grayish white pubescence; no dark hairs on vertex. Punctures on clypeus much closer than in female. Labrum very large, closely punctured, its apical margin incrassate, smooth and shining, clothed with a few yellowish hairs. Antennæ short; second joint of flagellum longer than third and fourth united; last joint a little compressed.

Thorax.—Entirely covered with dirty white pubescence, even the sternum, only on scutellum the hairs are brownish. Propodeum with longer and denser hairs as in female, the basal area concealed under the long pubescence.

Abdomen.—As in female, but the hairs on sides and apical margins much shorter, hence the fasciæ narrower and weaker, especially when seen from behind; fifth and sixth segments with orange-yellow fasciæ, and undefinited patches at sides basally formed by fuscous hairs; seventh segment with dense fuscous hairs.

Wings.—The origin of the cubital nervure a trifle nearer to base of wing than that of first recurrent nervure; this entering second cubital cell between middle and apex, closer to its middle.

Legs.—Stouter than in female, less hairy, the hairs pale. Hind coxæ very thick, almost without punctures, but clothed with fine, long, yellowish hairs. Claws with the median tooth longer than in female, almost reaching tip of claws.

Argentina; Santa Fé.

Female.—(Type) Dec. 30, 1910, on *Opuntia monacantha* Haw.

Male.—(Genotype). Same locality, without other date.

From *Teleutemnesta* s. *Emphor fructifer* (only the female is described by Holmberg) it differs by the mandibles not spotted with yellow; by the pubescence of thorax which is gray mixed with a few fuscous hairs in *fructifer*. The punctures on thorax of *opuntiæ* are neither very fine nor very close as in Holmberg's species. The scopa is fuscous in *opuntiæ*, fulvous in *fructifer;* the latter has the four basal segments of abdomen fringed with orange-yellow fasciæ.

The males described by Vachal as *fructifer* are perhaps another species as they are unusually small (10–11 mm.), while in the other known species the male is equal in size to female or even larger. From these so-called *fructifer* the new species differs by the tubercles being clothed with pale hairs as well as the anterior pair of legs and the femora of the remaining. All these are clothed with black hairs in Vachal's specimens.

E. tricolor (Friese) female has no transverse fasciæ of dark hairs on mesonotum and scutellum, but many gray hairs which replace sometimes all the black pubescence; the abdominal segments 2 and 3 have whitish fasciæ, and only the sides of third and fourth segments have yellowish fasciæ. Moreover, it is smaller (12 mm. long, 4 mm. late), against 13 and 4,5 mm. in *opuntiæ*.

The male of *E. tricolor* is smaller and has yellowish hairs only at sides of abdominal segments 3 and 4. The description given by Friese is very incomplete and not fit for comparison.

E. bifax Vach., judging from the very short description, is quite another insect.

Ptilothrix megasoma Brèthes seems to belong to *Emphor* too; it is a large bee (15 mm.) from Mendoza, and differs considerably from *opuntiæ*.

NOTES ON SCUTELLEROIDEA FROM VANCOUVER ISLAND.

BY DAYTON STONER,
Iowa City, Iowa.

During the latter part of the summer of 1913 the writer and Mrs. Stoner spent a few weeks at the Dominion Pacific Coast Biological Station, which is located on Departure Bay some three miles north of the city of Nanaimo on Vancouver Island. The principal object of the trip was to collect and investigate the marine fauna of the region and, due to the kindness of Dr. C. M. Fraser, Director of the Station, this phase of our work was exceedingly profitable. During our stay a few short excursions were made for the purpose of collecting insects. Only general collecting was attempted, and as a result the number of Scutelleroidea taken was not large.

Practically all the collecting was done within a radius of three miles of the Station, which is surrounded on the landward side by a dense growth of lofty coniferous trees. Here and there are more or less open places where the sun penetrates and where blue grass, timothy and clover grow to some extent. Further inland are pastures and open cultivated areas with an occasional marsh or lake.

The purpose of this brief article is simply to make available definite locality records for the species taken.

List of Species.

Family Scutelleridæ.

Homaemus aeneifrons (Say).

Not a common form in the region, less than a half dozen specimens having been taken on August 26 and September 4.

Eurygaster alternatus (Say).

This seemed to be the commonest scutellerid of the region, and it was found on the high grass around the edges of pastures, August 25 and 26.

Family Pentatomidæ.

Peribalus limbolarius (Stal).

But two specimens of this form were taken on August 26 and September 1.

Chlorochroa uhleri (Stal).

One of the most abundant species of the region. Adults, and nymphs in third and fourth instars were taken between August 25 and September 12. Toward the middle of September these bugs often congregated in numbers upon the blossoms of spiræa (*Spiræa* sp.), and on one occasion twelve individuals were photographed on a single blossom of this plant.

Euschistus euschistoides (Voll.)

Numerous examples were taken between August 28 and September 6 in pastures and from partly-cleared areas in the woods where a little blue grass and clover were making an attempt to gain a foothold.

Euschistus conspersus (Uhler)

A long series of specimens is at hand bearing inclusive dates from August 24 to September 12. This form was common on the long grass in pastures where cattle were feeding and in the high grass around the borders of such fields. The species was also taken on Gabriola Island. This rocky island lies in the Strait of Georgia several miles south of Departure Bay; it is about ten miles in

length, very narrow, and a good deal of its area is covered by pine and eucalyptus trees. Not many insects were taken on the island. This pentatomid was also taken on Brandon Island, a very small rocky island in Departure Bay, and perhaps a hundred yards from the Station. Only a very limited amount of vegetation is supported by the soil, and at high tide the island is pretty well covered by water. The bugs probably do not breed upon these small, rocky islands, of which there are a great many in the region, but are probably blown out or fly out from the main land.

Cosmopepla conspicillaris (Dall.)

Several specimens of this species were usually taken on each collecting trip. They were found more commonly in semi-cultivated areas. All the specimens are uniformly marked so far as colour pattern is concerned, but the transverse band across the pronotum varies in intensity from pale yellowish white in some specimens to deep reddish orange in others.

Eysarcoris intergressus (Uhler).

But a single specimen of this species, a female taken September 1, is represented in our material. This specimen is a little darker and has a more bronzed appearance than the other specimens in my collection, which are from Colorado and Washington. I believe that the species has not before been recorded from the latter State.

Thyanta custator (Fabr.).

This was the most abundant pentatomid of the region, and was taken on every collecting excursion between August 26 and September 12. Both pale yellowish and the typical greenish individuals are among the lot, but in none is the sanguineous band across the pronotum well marked, although it is evident in some of the pale forms. This bug was common in open places in the woods near the Station where a little clover and timothy were growing. Two specimens were also taken on Brandon Island September 1.

Banasa dimidiata (Say).

Seven specimens of this species were taken by us between September 1 and 6. All have the general body colour, a reddish brown with the anterior half the pronotum yellowish green. In none of the examples is the second segment of the antennæ more than one-half the length of the third.

Elasmostethus cruciatus (Say).

But one specimen of this species, a typically coloured female was taken on September 1.

Podisus serieventris (Uhler).

One adult female, taken September 1 and a nymph in the fourth instar constitute our only records for the species. The adult example is dark reddish in colour with the tips of the humeri and a spot on each hemelytron black.

A CORRECTION.

In my article entitled "Notes on Thysanoptera from British Columbia," issued in the Canadian Entomologist, Vol. LI, pages 181–190; on page 182 line 28 Plate XVI, fig. 1 should read Plate XVI, fig. 2, and on page 184, line 24 Plate XVI, fig. 2 should read Plate XVI, fig. 1.

R. C. Treherne,
Entomological Branch, Dominion Department of Agriculture.

NOTES ON ISCHYRUS QUADRIPUNCTATUS OLIV., BRED FROM FUNGUS.

BY HARRY B. WEISS,
New Brunswick, N.J.

On July 10 at Union (near Elizabeth), N.J., several partly grown larvæ and adults of this species were taken while feeding on a species of *Poria* growing on an old elm stump. Most of the larvæ were feeding openly on the surface of the fungus, while others were partly buried in it. Some of the larvæ were caged together with a supply of food, and these continued to feed up until July 16, by which time all of the fungus had been eaten. They then burrowed into the old, decayed bark and constructed cells in which they pupated. By July 20 all had transformed into pupæ, and on July 27 the first adult emerged, fully coloured.

According to Stevens,[1] members of the fungus genus *Poria* may be recognized by the sporophore being entirely resupinate, often widely extended, the base leathery to punky and the pores small and rounded covering almost the entire surface.

Full-grown Larva.—Length 9 mm. Width across mesothorax 2.5 mm. Elongate, subcylindrical, abdomen tapering slightly toward anal segment, segmentation distinct; antennæ three-jointed, subcylindrical, second joint longest and bearing minute third joint, which is tipped with a hair; prothorax twice as long as mesothorax; meso- and metathorax subequal in length; abdominal segments subequal in length. Colour white except for head which is dark and the dark brown to black, subrectangular, transverse, chitinized areas on the dorsal surfaces of the thoracic and abdominal segments, giving the dorsal surface a transverse banded appearance. Median, V-shaped, white line on head with point of V touching anterior, prothoracic edge; median, white, dorsal line on thoracic and abdominal segments; on either side of the median, dorsal line on prothorax is a wider, somewhat curved, white line, which taken with median line divides the dark area into four parts, the lateral parts being subcircular; dark areas on dorsal surfaces of head, thorax and abdomen bear numerous white hairs with prominent, tuberculate, dark bases becoming largest on the last five or six abdominal segments; dorsal surface of last abdominal segment bears two prominent, spine like tubercles curved anteriorly, these tubercles bear smaller tubercles each tipped with a white hair; lateral surfaces of thoracic and abdominal segments bear several hairs with tuberculate bases; tubercles on lateral portion of head posterior to antennæ are the largest; ventral surface and legs white and sparsely hairy; spiracles on second thoracic and abdominal segments one to eight.

Pupa.—Length 8.5 mm. Width across thorax 3.2 mm. White, elongate-oval, rounded anteriorly, gradually tapering posteriorly; head, thorax and wing-cases, especially prothorax, covered with minute, reddish-brown tubercles each bearing a long, white, spine-like hair; transverse patches of similar tubercles on dorsal and ventral abdominal segments, more numerous on dorsal surface; lateral surface of each abdominal segment bears two groups of slightly longer tubercles each bearing a long hair; lateral spine-like hairs are longer than other

1. Stevens, F. L., The Fungi Which Cause Plant Disease, 1913.

body hairs; anterior, median, dorsal surface of prothorax bears a pair of prominent tubercles, each tubercle bearing two reddish-brown, prominent, posteriorly directed, curved spines (giving an antler-like effect); posterior, median, dorsal surface of prothorax bears a pair of smaller tubercles each with two posteriorly directed spines, the anterior spines being strongly curved: mesothorax bears a pair of median tubercles each with a large, posteriorly directed spine and a smaller, perpendicular one anterior to it; metathorax bears pair of tubercles each with a posteriorly directed spine; bases of thoracic tubercles all bear smaller, reddish-brown tubercles, those on meso- and metathorax being arranged in a circle; median, dorsal portions of abdominal segments one to eight bear eight, large spines with tuberculate bases, arranged in a double row of four each, the anterior four usually being anteriorly directed and the posterior four being posteriorly directed; on last three abdominal segments these spines become closer together and appear to radiate somewhat; last abdominal segment bears a dorsal pair of prominent, anteriorly directed, curved, chitinous spines; all spines reddish brown; fewer tuberculate, spine-like hairs on ventral surface.

Adult.—Ischyrus quadripunctatus. This was described by Olivier in 1808 (Enc. Meth. Ins. VI, 437). Blatchley[2] states that it is frequent throughout Indiana, Jan. 21–Dec. 8, being gregarious in winter and hibernating beneath bark and logs, also it is often found at sap in early spring and on fungi in the summer. Smith[3] records it only from Caldwell and Westville in New Jersey, but it occurs in various other places in the state. Chagnon[4] lists it from Quebec, Canada. Beutenmuller in his "Bibliographical Catalogue of the Described Transformations of North American Coleoptera"[5] gives the following single reference to the larva, "1855, Larva (Fig.) Chapuis et Candeze. Mem. Soc. Sc. Liege VIII, 22 pl.

NOTE ON THE DISTRIBUTION OF *ATTEVA AUREA* FITCH.

BY FRANK M. GIBSON, PH. D.,
Baltimore, Md.

This moth was first described by Asa Fitch in his Third Report on the noxious, beneficial and other insects of the State of New York, but he does not report its occurrence in that State, having prepared his description from a specimen sent him from Savannah, Georgia. Dyar gives its habitat as the Southern States; Holland as the southern portion of the region covered by his *Moth Book*, from the Gulf States southward and westward, into Mexico and lands still further south.

. In July of the present year, I found in this city, feeding upon ailanthus, certain larvæ which were unknown to me. They pupated while suspended in a loose, irregular net spun among the leaves, and emerged July 25–28. I sent one of these to Dr. Barnes, who kindly confirmed my identification of it, and stated that he had raised the moth at Decatur, Illinois, on ailanthus, and that Mr. Poling had bred it at Quincy in the same State. This would indicate a far wider distribution for it than that assigned by Holland and Dyar.

2. Blatchley, W. S., Coleoptera of Indiana, p. 546.
3. Smith, J. B., Insects of N. J. (N. J. St. Mus. Rept., 1909).
4. Chagnon, G., Coleoptera of Quebec.
5. Jour. N. Y. Micros. Soc., Vol. VII, No. 1, 1891.

THE ENOMOLOGICAL SOCIETY OF AMERICA, ANNUAL MEETING.

The Fourteenth Annual Meeting of the Entomological Society of America was held at St. Louis, Mo., on December 29 and 30, 1919. The chair was occupied by the President, Professor J. G. Needham, and there was a goodly attendance of members present.

The following is a list of the papers read at the meeting:—

Tropisms in Insect Behaviour—An Enquiry. C. H. Turner.

The Food Plants and Distribution of Certain Calendra Species. A. F. Satterthwaite

The Biology of the Carabid Genera Brachynus, Galerita and Chlaenius. J. L. King.

The Influence of Environmental Factors in the Hatching of the Eggs of Aphis Prunifolia, Fitch. Alvah Peterson.

Insects of the Between-Tide Zone of the North Carolina Coast. Z. P. Metcalf and Herbert Osborn.

Observations on Canadian Ticks. Seymour Hadwen.

Notes on the Mouth-parts of Aradidæ. C. S. Spooner.

The Genitalia of the Syrphidæ. C. L. Metcalf.

Observations on the Genitalia of Lachnosterna. Wm. P. Hays and J. W. McCulloch.

Notes on the Leafhoppers of the Subfamily Gyponinæ. E. D. Ball.

The Production of Abnormal Larvæ, Pupæ and Adult Beetles by Gas Secreted by the Confused Flour Beetle (*Tribolium confusum*). R. N. Chapman.

Serum Diagnosis and Insect Relationship. Robt. D. Glasgow and Josephine Burns Glasgow.

The Syrphid Fly (*Mesogramma marginatum*) Caught By Flowers of the Dogbane. R. C. Osburn.

A special feature of the meeting was a symposium on "The Life Cycle of Insects," which aimed to give a "bird's-eye view" of the entire subject. The scope attempted was as follows: 1. Facts as to form changes, broods, length of life, moults. 2. Significance of facts in relation to nature of environment, reproductive capacity, rate and times of growth, habits, etc. Briefest possible statement of what each group best illustrates in relation to the life cycle.

The subject was presented by groups as follows:—Apterygote Insects, J. W. Folsom; Orthopteroids (sens. lat.), E. M. Walker; Hemiptera, (excl'4), E. D. Ball; Aphids and Coccids, Miss Edith M. Patch; Neuropteroids having complete metamorphosis, and Lepidoptera, S. L. Fracker; Coleoptera, (including Strepsiptera), R. N. Chapman; Diptera, C. L. Metcalf; Hymenoptera, T. D. A. Cockerell. Concluding remarks on the general subject were made by Prof. S. A. Forbes.

The Annual Address was delivered on Tuesday evening by Dr. W. J. Holland, Director of the Carnegie Museum, Pittsburgh. His subject was "The Evolution of Entomological Science in North America."

VARIATIONS OF BUPRESTIS VIRIDISUTURALIS, NICOLAY & WEISS.

BY RICHARD T. GARNETT,
Oakland, California.

In my collection, although there are but two perfect specimens of this species, I have the elytra of twenty-nine other specimens. This is a large enough series, I should judge, to give the general trend of markings in this very variable species.

In the plate given by Nicolay and Weiss of this species the male is represented with a thin sutural marking and about two-thirds the distance from the anterior edge a triangular dark marking on the disc extending from the suture as a base. Of the five male elytra that I have, one is like their figure. The other four have only an extremely thin sutural marking with a small humeral spot in one (Fig. 8).

Of the twenty-six female elytra there is but one that I have that approaches exactitude with that of the plate given by Nicolay and Weiss. I have them varying from the nearly all yellow elytra (Fig. 2) to the half dark colouring of (Fig. 10). Figures 4 and 5 show how the sutural markings are connected or tend to become connected (Fg. 4) with the lateral markings. Figure 4 also shows the maximum number of spots present on any one set of elytra in my series.

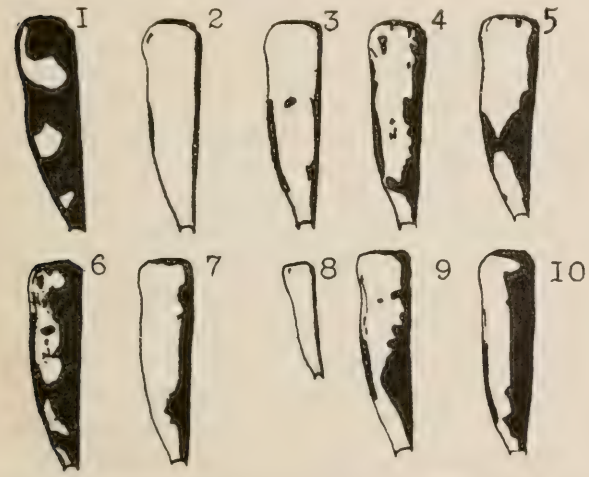

Fig. 5. 1.—Elytron of *B. gibbsii* Lec.: 2, 3. 4, 5, 7, 9. 10.—Elytra of *B. viridisuturalis* Nicolay & Weiss. (Female); 6.—Composite elytron of variations of *B. viridisuturalis* N. & W.; 8.—Elytron of *B. viridisuturalis* N. & W. (Male).

One thing that I examined especially was the colour; and, as my series for the most part had died some time before collection, I used chloroform and a moistening box to bring back the natural colour in case the colour present was not the natural one. This failed, however, to bring any results, and as far as I can see the colour of the majority of my *viridisuturalis*, that is, of the dark markings along the suture, is identical with that of the dark markings of *B. gibbsii* Lec., a metallic greenish purple.

Going a little further I took a composite of all the markings found in my series (Fig. 6) to compare it with the markings found in my specimens of *B. gibbsii* (Fig. 1). There are some points of similarity, as can be seen in the humeral lunule and the almost completely divided median spot. Perhaps some day a specimen will be found with similar markings, for if various specimens may have such varied markings it is reasonable to believe that some specimens may have a combination of these markings.

Thus I believe it may be safely stated that while *B. viridisuturalis* is certainly a distinct species it may simulate in markings *B. gibbsii* somewhat, and

also in the colouring, with the exception that there is never orange on the elytra of *B. viridisuturalis* as far as I have observed them. The females of *B. viridisuturalis* are also usually 1 or 2 mm. longer than *B. gibbsii*.

My *B. gibbsii* were taken in Trinity Co., Calif., breeding in oak, (a fallen log), while my specimens of the other were taken from dead wood of a live standing cottonwood at Oro Grande, San Bernardino Co., Calif. *Gibbsii* I believe breeds only in oak (vide Leach & Van Dyke), while Van Dyke says that so far as he knows, *B. viridisuturalis* is confined to the cottonwoods.

NOTES ON MYCOTRETUS PULCHRA, SAY AND ITS FUNGOUS HOST.

BY HARRY B. WEISS,
New Brunswick, N.J.

This member of the family Erotylidæ was found breeding in *Polyporus chioneus* at Monmouth Junction, N.J., on September 8. At this time larvæ, pupæ and several adults were present, with the larvæ most plentiful. The infested fungus was moved to the laboratory and kept moist by being placed close to a wet sponge. The larvæ continued to feed in the context of the fungus until they were full grown, when they then entered the pores of the sponge and pupated, the sponge being rather dry at that time. From this it appears likely that pupation in the field takes place in the wood to which the fungus is attached. Under laboratory conditions the pupal stage required from ten to twelve days during the last half of September. The appearance of the adults this late in the season indicates that hibernation takes place in this stage.

Polyporus chioneus Fries[1] has a soft and watery pileus when fresh, and occurs on the dead wood of deciduous and coniferous trees. Numerous specimens of other fungi were examined during the past year, but *Mycotretus pulchra* Say was found associated only with *chioneus*. However, it is extremely probable that other watery forms such as *P. borealis*, *P. albellus*, etc., are attacked.

Full-grown Larva.—Length 6.2 mm. Width 1.5 mm. Whitish, head often slightly browned; subcylindrical, prothorax twice as long as mesothorax; mesothorax and remaining body segments except last two are subequal in length; last two segments shorter; head, prothorax, and last two abdominal segments narrower than remaining segments which are subequal in width (some larvæ have expanded grub like abdomens); body and legs sparsely hairy, hairs short; abdominal spiracles project slightly from the body appearing as minute, somewhat blunt spines.

Pupa.—Length 4.4 mm. Width across wing-cases 1.9 mm. Whitish, suboval, rounded anteriorly, tapering to a point posteriorly; head, prothorax and wing-cases thickly clothed with spines each bearing a long hair; fewer spines on leg-cases and ventral abdominal segments; anterior edge of prothorax bears a pair of median irregularly shaped knob-like tubercles each bearing several spines; smaller, somewhat similar median pairs of tubercles on posterior edges of pro-, meso- and metathorax; each abdominal segment bears a transverse dorsal row of spines with a rosette-like group of five or six at the lateral edge, these rows continued on the ventral surface but with fewer spines; body terminated dorsally by two comparatively long, curved spines and ventrally by

1. Identified by Mr. Erdman West.

two lateral, rosette-like groups of spines; abdominal spines directed posteriorly; all spines bearing long hairs; entire dorsal surface bears smaller spines intermixed with those mentioned above.

Adult.—Mycotretus pulchra. This was described by Say in 1826 (Jour. Phil. Acad. Nat. Sci. V, 301; ibid. II, 345) under the generic name *Tritoma*. It is about 3 to 3.5 mm., long, ovate, with the head, thorax and scutellum black, the elytra red with the apical third obliquely black, the black extending forward on the sides almost to the humeri. The head and thorax are finely and sparsely punctured, the punctures of elytral striæ are fine, the intervals finely punctate.

Smith[2] records it from Hudson County and Woodside, N.J., with the statement that it was once common. Blatchley[3] states that it is frequent in Marion, Vigo, Knox and Posey Counties, Indiana, April 9–June 19, and in Chagnon's Coleoptera of Quebec[4] it is listed from Rouville Co., June, Montreal Isl., June and Laval Co., August.

A NEW GENUS AND SPECIES OF APHID FROM JAPAN. (HEM.)

BY RYOICHI TAKAHASHI,
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This interesting aphid, which is found in the leaves of *Podocarpus macrophylla*, is rather inactive in habit. Both winged and wingless forms appear in May and later, in the second and subsequent generations. The sexuparæ are wingless, but most interesting is the fact that the oviparous female, as well as the male, is winged, these forms appearing during the month of September. As is common for species belonging to the Siphonophorina, wingless viviparous females may give birth to both winged and wingless progeny, but winged females produce only wingless forms.

Neophyllaphis, new genus.

This genus is closely related to *Phyllaphis* Koch, but differs from it as follows:

1. Sensoria on the third segment very peculiar in shape, being transversely narrow.
2. Body of the wingless form covered with white secretions which are not thready.
3. The oviparous female is winged.

Winged female.—Body rather narrow and without hairs. Frontal tubercles absent. Antennæ nearly as long as body, six-segmented, spur of last segment very small, sensoria on third segment transversely narrow (ring-like in the oviparous female). Ocelli prominent. Abdomen without tubercles. Wings hyaline, the third oblique twice branched. Cornicles very small and much wider than long. Cauda not globular, but is constricted at base and slightly so at middle. Anal plate slightly sinuate. Empodial hairs absent.

Wingless female.—Similar to the winged female. Body with a white pulverulence. Eyes very small. Third antennal segment without sensoria.

Type.—*Neophyllaphis podocarpi*, n. sp.

2. Insects of New Jersey (N. J. St. Mus. Rept. 1909).
3. Coleoptera of Indiana, p. 546.
4. Prelim. List Ins. Prov. Quebec, Coleop. (1917, Suppl. Rept. Quebec Soc. Protec. Plants.)

Neophyllaphis podocarpi, n. sp.

Winged viviparous females.—Body rather narrow and without hairs. Frontal tubercles inconspicuous. Beak slender and reaching beyond the hind coxæ. Eyes large, ocelli prominent. Antennæ slender, without hairs, two basal segments very short, the third nearly as long as the fourth and fifth combined and bearing about 60 small, transversely narrowed sensoria scattered over the entire length, the fourth slightly shorter than the fifth and without sensoria, sensoria at the distal end of the fifth segment small and circular, the sixth as long as the fourth with a small, round sensorium near the apex, spur of last segment very short. Wings not narrow, the third oblique vein twice branched. Abdomen without tubercles. Cornicles very small, much broader than long and broadest at base. Cauda large, rounded at apex, constricted at base and lightly so at middle. Anal plate sinuate. Legs moderately long, slender, and with a few short, fine hairs. Empodial hairs absent.

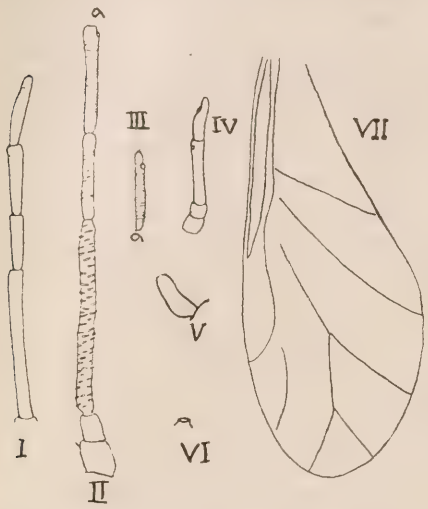

Fig. 6. *Neophyllaphis podocarpi* n. sp. I, antenna of wingless viviparous female; II-III, antenna of winged viviparous female; IV, antenna of immature form; V, lateral view of cauda of viviparous female; VI, cornicle of viviparous female; VII, wing of viviparous female.

Colour dark reddish purple, eyes brownish red, and legs pale brown. Wings hyaline with brown veins.

Length of body 1.3 mm.; of antenna 1.1 mm.; of fore wing 1.7 mm.

Wingless viviparous female.—Body narrow, being broadest at middle, slightly pulverulent, and hairs absent. Frontal tubercles absent. Eyes very small. Beak slender and reaching beyond hind coxæ. Antennæ not reaching to tip of body, slender, and without hairs, third segment longer than the fourth and fifth combined, the fourth shorter than fifth, and the fifth subequal in length to the sixth, spur very short, sensoria absent excepting a single round one near apex of the fifth segment. Body without tubercles. Cornicles, cauda and legs as in the winged female.

Colour dark reddish purple, eyes black, antennæ and legs pale brown, cornicles black and cauda pale black.

Length of body 1.5 mm.; of antennæ 0.9 mm.

Winged male.—Third antennal segment bearing numerous transverse sensoria which are irregularly scattered over the entire segment; fourth, fifth and sixth segments with fewer similar sensoria.

Winged oviparous female.—Third antennal segment with numerous long, encircling transverse sensoria regularly placed; none on remaining segments except the usual distal ones on the fifth and sixth segments. Hind tibia swollen and bearing numbers of sensoria on basal half.

Type Locality.—Meguro, Tokyo, Japan.

As in *Neophyllaphis podocarpi* the oviparous females of *Greenidea kuwanæ* Perg., *Trichosiphum tenuicorpus* Okag., and *Cervaphis quercus* Tak., are winged.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The fifty-sixth annual meeting of the Entomological Society of Ontario was held at Ottawa on November the sixth and seventh. The attendance was good and very representative of the national character of the Society, members being present from Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba and British Columbia. In addition to the Canadian members there were two welcome visitors from the United States: Mr. C. L. Marlatt, Assistant-Chief of the Bureau of Entomology, Washington D. C. and Dr. Summers of Massachussets.

The programme, as the list of subjects given below will show, was not only a full one but covered a wide range of Entomology. Most of the papers were of an economic nature, but several—and these not the least interesting, eschewed the economic aspect altogether and gave instead the results of the observations and studies of the insect lover and naturalist.

The papers which aroused the most discussion were "The Chief Factors in Natural Control" by J. D. Tothill and "My Experience in Dusting and Spraying" by Father Leopold. It was very interesting to observe the difference of opinion as to the importance of such control factors as weather or climate, and scarcity of food supply. There was also a decided difference of opinion as to the best spray mixtures for apple orchards between the Nova Scotia men on the one hand and the Ontario, Quebec and British Columbia men on the other hand. The Nova Scotia Entomologists claimed that under certain weather conditions lime-sulphur applications caused a very noticeable drop of apples which lessened the size and value of their crop; the Entomologists of the other provinces claimed that in their respective provinces there was no evidence of this drop or of any lessening of the crop. Father Leopold's experience was in accordance with the latter view.

The symposium on the Cabbage Maggot was interesting and not only corroborated last year's evidence of the value of corrosive sublimate as a remedy for this pest, but also brought out several new and possibly equally good remedies. The results of further experiments with these next year will therefore be looked forward to with interest.

The popular evening lecture by C. L. Marlatt on "How the United States is preventing the Introduction of Foreign Insect Pests and Plant Diseases" was highly appreciated and felt to be of special value to Canadian Entomologists as was pointed out by the President of the Society when proposing a vote of thanks.

On the evening of the seventh the members and guests were entertained by the Ottawa Naturalists' Club at a smoker in the rooms of the University Club.

The officers for next year are:—President, Mr. Arthur Gibson; Vice-President, Mr. F. J. A. Morris; Secretary-Treasurer, Mr. A. W. Baker; Curator, Mr. G. J. Spencer; Librarian, Dr. C. J. S. Bethune; Editor, Prof. E. M. Walker. The list of papers read was as follows:—

1. Insects of the Season in Ontario—W. A. Ross and L. Caesar.
2. Insect Conditions in the Province of British Columbia—R. C. Treherne.

3. Results of some Preliminary Experiments with Chloropicrin—G. J. Spencer.
4. Ephydra hians and its Occurrence in Western Canada—Dr. C. Gordon Hewitt.
5. Our Common Cercopidae—George A. Moore.
6. Further Notes on the Control of the Pear Psylla—W. A. Ross and W. Robinson.
7. My Experience this year in Dusting and Spraying—Rev. Father Leopoid.
8. The Chief Factors in the Natural Control of Insects—J. D. Tothill.
9. The Present Condition of the Balsam and Spruce Injury in Quebec—J. M. Swaine.
10. Recent Observations on Eastern Ticks.—S. Hadwen.
11. How The United States is Preventing the Introduction of Foreign Insect Pests and Plant Diseases—C. L. Marlatt.
12. Hopkins Bioclimatic Law—W. Lochhead.
13. On the Wings of the Wind—A. F. Winn.
14. Locusts in Manitoba with Special Reference to the Outbreak in 1919—Norman Criddle.
15. Ecological Notes on Certain Species of Locusts prevalent in British Columbia—E. R. Buckell.
16. Symposium on the Cabbage Root Maggot and its Control in 1919. —W. H. Brittain, R. C. Treherne, Arthur Gibson and L. Caesar.
18. Present Status of Pests of Canadian Flour Mills—E. H. Strickland.
17. Life-History of a Hobby Horse—Part II: Boy and Man—F. J. A. Morris.
18. Some Notes on the Life-History of our Common June Beetles—H.F. Hudson.
19. Further Notes on the Life-History and Control of the Strawberry Root Weevil—W. Downes.
20. The Strawberry Weevil—W. A. Ross.
21. Borers in Corn and other Field and Garden Plants which have been or may be mistaken for the European Corn Borer—Arthur Gibson.

L. C.

RECENT CANADIAN PUBLICATIONS.

(Continued from Vol. LI, p. 282.)

Annotated Check-List of the Macrolepidoptera of Alberta.—By Kenneth Bowman. Published by the Alberta Natural History Society. Red Deer, Alberta, 1919.

In this list the author has endeavoured to present in a concise form all the available data on the distribution of the Macrolepidoptera within the Province of Alberta. The work has an attractive appearance, being printed in clear type on a good quality of paper. The generic names, printed in bold-faced type, and followed by the specific names arranged in a column, each name preceded by its number in Barnes and McDunnough's check-list. Two columns follow, giving seasonal and geographical distribution respectively, the former

by numerals indicating months, the latter by abbreviations of locality names, in most cases single capital letters. Two of such treble columns occupy each page, and although a considerable amount of information is thus presented there is no appearance of crowding. Eight hundred and twenty species are listed, and it will be remembered that the "micros" are not included.

A comparison of this list with Winn's Quebec list brings out some interesting facts. The butterflies of Alberta (116 species) outnumber those of Quebec (84 species) by more than one-fourth of their number, while in all the other groups the Quebec list leads. There are more than twice as many Sphingidæ in Quebec than in Alberta (33:15), five times as many Saturnioidea (10:2), and six times as many Sesiidæ (12:2), while the differences in the Arctiidæ (including Lithosiidæ and Nolidæ—37:34), Noctuidæ (488:428) and Geometridæ (193:167) are relatively slight.

Directions for Collecting and Preserving Insects.—By J. H. McDunnough. Circular No. 12, Entomological Branch, Dept. of Agriculture, Ottawa.

This circular gives brief directions for the ordinary methods of collecting and preserving insects and will be found useful, particularly to the novice. A description of the collecting outfit is followed by instructions for collecting the various orders of insects, preserving, mounting and shipping entomological specimens; and for their arrangement in the collection.

From the Agricultural Gazette:—

The Pear Psylla.—By W. A. Ross. Vol. 5, No. 12, Dec., 1918. A brief account of the injuries caused by this pest, its life-history, natural and artificial control. It is illustrated by a plate on which the various stages and work of the insect are shown.

The History of the Codling Moth in British Columbia.—By R. C. Treherne. Vol. 6, No. 1, Jan., 1919.

Since 1905 at least 12, probably 13, distinct outbreaks of the codling moth have occurred in British Columbia at widely separated points, a marked increase in their numbers having taken place since 1912, coincident with a noted rise in the fruit yielding capacity of the orchards of this Province. Vigorous action has been taken by the Provincial authorities to eradicate these outbreaks, the Dominion Entomological Branch acting in an advisory capacity during the past three years. At the close of 1918 codling moths are believed to exist in small numbers in the vicinity of Vernon, Okanagan Landing and Victoria, but have been nearly or quite exterminated from the other localities where outbreaks have occurred.

The operations undertaken wherever outbreaks are reported are described, including the procedure followed in the disposal of fruit in infested areas.

The Rose Midge in Ontario.—By Wm. A. Ross. Vol. 6, No. 2, Feb., 1919. A brief account of this pest, which has been known in Ontario only since 1914. Its life-history, the nature of its injuries, the varieties of roses attacked and methods for its control and prevention are described

The Balsam Injury in Quebec and its Control.—By J. M. Swaine. Vol. 6, No. 3, March, 1919.

This paper describes a serious condition of the Balsam Fir in the Province of Quebec, originating in an outbreak of the Spruce Budworm a few years ago, as a result of which the trees were killed over hundreds of square miles, and those not killed outright have subsequently fallen victims to other insect and fungus enemies. These are the Ground Rot (*Polyporus schweinitzii*), the Sap Rot, the Eastern Balsam Bark-beetle and the Eastern Balsam Weevil. The future of the balsam in the affected regions is not considered to be bright. Suggestions for improving the situation are dealt with under three headings: (1) Utilize the threatened balsam; (2) Burn the slash, and (3) Increase the percentage of spruce in the stand.

The Poplar Borer. — By R. N. Chrystal. Vol. 6, No. 4, April, 1919. This paper is the outcome of observations by the author on a case of serious damage to cottonwood on a ranch near Cowley, Alberta. It contains an historical account of the depredator (*Saperda calcarata*), descriptions of the larva and adult, and of their life-history and work. Remedial measures are suggested for dealing with outbreaks of the beetle on a large scale and for treating individual trees.

The Greenhouse Leaf-tyer (*Phlyctænia ferrugalis* Hbn.).—By Arthur Gibson. Vol. 6, No. 7, July, 1919. This is another European insect, known in Canada since 1899, and now widely distributed in the East. The caterpillars attack a wide range of greenhouse plants, particularly soft-leaved species. The life-history, injuries, enemies and methods of control are described.

An Infestation of Apple Sucker, Psyllia malis, Schmidb., in Nova Scotia—.By W. H. Brittain. Vol 6, No. 7, 1919.

This is a new and very undesirable immigrant from Europe, which appeared in a severe outbreak at Wolfville, N.S. Full descriptions and figures of the adult and fifth nymphal instar are given. The injury is similar to that of the Pear Psylla, the really serious damage being caused by the nymphs only. At the season of its discovery the outbreak was too advanced to permit of saving the crop, but preliminary tests with a liquid spray (nicotine sulphate, one pint to 100 gallons of water, applied as a heavy drenching spray by means of a "Friend" gun) gave excellent results. Other tests were made with various contact dusts, but were less effective.

From the Ottawa Naturalist:—

The Genus Vespa in Canada. Key to the species. By F. W. L. Sladen. Vol. XXXII, No. 4, Oct. 1918, pp. 71-72. Four new species are accorded, *V. norvegicoides, albida, acadica* and *atropilosa*

Insect Galls and Gall Insects. By E. P. Felt, Albany, N.Y. Vol. XXXII. No. 7, Jan., 1919, pp. 127-131. A popular account of this subject, describing some of the structural and adaptive features of insect galls, the relations between gall insects and their plant hosts, the alternation of generations in the Cynipids and gall aphids, the apparent mimicry of some galls, occurrence of inquilines, etc. It is illustrated by two plates, showing characteristic forms of insect galls. E.M.W.

(To be continued.)

Mailed January 27th, 1920

The Canadian Entomologist

Vol. LII. LONDON, FEBRUARY, 1920. No. 2

POPULAR AND PRACTICAL ENTOMOLOGY.

A Day's Beating.

BY C. A. FROST,

Framingham, Mass.

The rosy dawn of this early June morning has been followed by dull gray, clouds which, slowly massing across the sky, presage rain for the afternoon. A good day for the beating umbrella both for catching beetles and for shelter on the way home.

My preparations for a day in the woods are generally made the evening before, or I am sure to forget something in the hurried morning start. A large, wide-mouthed bottle for the bulk of the catch and several small vials for the minute things or paired specimens that should be kept separate, filled with alcohol (denatured is just as good for the purpose), are deposited in pockets convenient for instant use. A small cyanide bottle for specimens whose colour will not stand alcohol, and a large cyanide jar for Lepidoptera or other insects interesting to brother collectors, are placed in side pockets or in the corduroy bag that is slung over my shoulder. This bag contains: a large knife, a trowel, a drinking cup, a fine wire strainer of five inches diameter for dipping up water beetles, an old pair of gloves to protect the fingers when much collecting is done under stones, two or three tin boxes to which I transfer Lepidoptera and Hymenoptera as soon as they are dead (to prevent rubbing), a white cloth with loops at each corner to hold two diagonally crossed sticks which will keep the cloth spread so that it can be used in place of the umbrella if that instrument collapses (as often happens) at the most interesting point of the capture. I also have a net that fits into the bag, made of brass wire leaded into a brass union, which in turn is screwed into a brass increaser; into the larger end of this a stick can be screwed and fastened by a tack through a hole drilled in the rim of the increaser. Nets of several sizes or kinds can be carried along, and at once interchanged by merely screwing them into the increaser. Last but not least I make sure that my forceps are in the sheath that is pinned on the inside of my coat at the most convenient height for hurried seizing.

Thus equipped I hasten down the side streets to the railroad tracks that lead to Sherborn town. Half a mile brings me to an interesting swamp beside the track and, although within a stone's throw of a busy foundry, I am seldom able to get past it without investigating its possibilities. In this swamp all the wood has now been cut off but a few old willows, and the dead and dying bushes and young trees often yield some very good things. It is here that I take *Pogonocherus salicicola* Casey, and the species was determined for me by its describer from specimens that emerged from dead twigs collected from these willows.

Splashing through the ankle-deep brown water I cannot resist an attempt

to get something from the bunches of live willow sprouts that have escaped the grass fires. The attempt always brings a multitude of *Crepidodera helxines* L., or a shower of brown-tail moth caterpillars into the umbrella, and to-day is not the exception. I have occasionally found a few *Rhynchites cyanellus* Lec. among the usual vermin.

My beating stick is any handy dead limb of suitable length, and it can easily be replaced. The blows on the scraggly old dead willows shower down bits of bark and moss with an occasional *Allandrus bifasciatus* Lec., *Acoptus suturalis* Lec., or *Chramesus icoriæ* Lec. From the smaller trees I get a score of *Laemophlaeus adustus* Lec. and *convexulus* Lec., an occasional *biguttatus* Say or *fasciatus* Mel., *Psenocerus supernotatus* Say, *Orchesia castanea* Melsh., and still more rarely *Pogonocherus salicicola*, *Lepturges querci* Fitch and *facetus* Say. Across the track the alders and fire-killed bushes yield numbers of *Laemophlaeus* and *Molamba* which are barely discernible as minute dots crawling on the dark umbrella. Some of the Cerambycids remain perfectly still on the cloth, and are occasionally picked from the very edge where the least motion would tumble them to safety.

New fields lure me on down the track half a mile more to the woods and meadows, but I must always stop to take a whack at the clump of poison sumac growing by the fence on the edge of the swamp that stretches away to the brook beyond the higher ground. It yields as usual only *Psenocerus supernotatus*, and the chokecherry and red maple are even less productive, although I have taken some good things from the sprouts of the latter, notably *Purpuricenus humeralis* Fab., *Limonius aurifer* Lec. (in Maine), and *Corymbites nigricornis* Panz. (typical *nitidulus* Lec.) once in numbers.

Near the track fire has killed all the large trees of the high ground, and it has grown up with bunches of blueberry, amelanchier and sweet fern. The former yields nothing at all generally, but the amelanchier I have now visited at the most favourable time, and when I have finished with them I have several specimens of the rare *Agrilus vittaticollis* Rand. and a set of *Saperda candida* Fab. The latter I have never taken otherwise, except once only, when I suddenly saw one balanced on the tip of a dead sprout almost between my legs.

Travelling east again down a wood-road, I visit a few white pines that have escaped the fires. The lower branches of these I am able to reach with a long limb, and almost the first blow brings down a beautiful green beetle, *Chrysobothris harrisi* Hentz, a very welcome find. I attack the trees with renewed vigour when a sharp sting in the vicinity of my collar bone causes me to suspend operations with visions of a ferocious, white-faced hornet probing about my jugular vein. Hastily throwing off my coat and bag I frantically try to dislodge the intruder by tearing open my shirt and getting head down over the umbrella, for entomological curiosity compels me to search out the identity of the insect that has violated the sanctity of my person. At intervals during these manoeuvres, when the clothing binds the insect, it deliberately, but with unexpected moderation, punctures my skin, selecting five different places before it is released and falls to the umbrella; it is a yellow hymenopter whose identity is unknown to me. After arraigning the intruder in appropriate, if not ethical, language the search for *C. harrisi* is continued with one more specimen as a reward. In Maine *Corymbites medianus* Germ., and *propola*

Lec., and *Harmonia picta* Rand. are common fruit of the white pine, but not here. I have taken *Rhinomacer elongatus* Lec. in numbers and *Dinoderus substriatus* Payk. sparingly by beating cut pine tops when the needles were dead enough to fall.

From these trees I wander through the red maple saplings, speckled alder and blueberry bushes to the edge of the meadow with its gently-waving grasses and tangled cranberry vines. I recline at ease on the soft grass on the bank of a slowly flowing brook, and watch the crows silently flying to and from their nests that I know are hidden in the woods beyond. *Dineutes* and *Gyrinus* are whirling and spinning on the water at my feet. The tiger beetles, *C. repanda* Dej., are hunting on the patches of white sand of the further bank. To the right is a grove of waving pines, the green of their needles contrasting pleasingly with the darkness of their trunks; in front of me are tall chestnuts and oaks; to the left of the green meadow is traversed by the brook that disappears in a sudden bend behind the oaks and chestnuts. Many happy hours have I spent beside this brook, and again I recall the day I swept *Leptura deleta* Lec. from the Spiræa blossoms almost within the shade of the murmuring pines; the time I almost got *Leptura subhamata* Rand. on the same flower, and the plant which bore it is now within my sight. How I pawed around in the dead grass on hands and knees on the soggy meadow bottom for a full hour after the elusive specimen, and with what regrets I finally gave up the quest. And so each spot recalls some entomological event that is again enacted as I dream beside the winding stream. A spotted turtle goes pawing his course down along the bottom of the brook and reminds me that I must be on the move, for it is nearing noon, and although the rain still holds off it will not spare me much longer.

I must try the grove of young pines half a mile further on for I have found that pines and other evergreens along the edges of a wood are the hiding places of many beetles in cloudy weather, and even in sunny weather after 4 p.m. or before 10 a.m. I have also had wonderful luck sweeping *Alnus incana* bushes in Maine at sunset, taking many rare things in numbers, such as *Elater sanguinipennis* Say, and *semicinctus* Rand., *Cardiophorus convexulus* Lec., *Melanotus leonardi* Lec., *Corymbites hamatus* Say, *Lyctus striatus* Melsh., and *opaculus* Lec., *Saperda obliqua* Say, and *lateralis* Fab., *Oberea pallida* Casey, *Agrilus pensus* Horn and many other lesser lights. By beating Alnus sprouts when the sun was shining in the afternoon I once took many *Dicerca caudata* Lec., *Eupristocerus cogitans* Web., and *Oberea pallida* in Maine. In Massachusetts I have had no such good luck with Alnus, and can only record *Anomala lucicola* Fab. *Harmonia similis* Rand. and *Adalia frigida* Schn., all of which are rather uncommon in this locality.

Down the brook, ignoring the fine sweeping grounds on either side, I hasten on towards the rocky hill fringed with scattered pitch pines and topped with small oaks, hickories and well-browsed hazel bushes. On the south slope is an open grove of young white pines that should well repay a visit. The first tree gives me a regular shower of *Dichelonycha albicollis* Burm. and *Glyptoscelis pubescens* Fab., both of which are well-known products. A thorough canvass of the trees yields nothing else, but a barberry bush in flower drops an *Elater collaris* Say into my umbrella to lighten the disappointment.

I try the hickories, which on sunny days may have some *Anthaxia quercata* Fab. (and later, in July, *Dicerca lurida* Fab.), *Saperda lateralis* Fab. or *Tymnes tricolor* Fab., but nothing appears except *Sinoxylon bidentatum* Horn from the dead twigs. The hazel bushes are also non-productive to-day except for *Chlamys plicata* Fab., which can be swept by dozens from sweet fern at times, and a few *Attelabus rhois* Boh. If the sun were shining I should expect *Agrilus otiosus* Say in numbers, *arcuatus* Say (variety *coryli*) and *politus* Say, which so resemble each other in colour as to be indistinguishable without a lens, *Calligrapha rhoda* Knab, and possibly a few *Agrilus defectus* Lec. and *cephalicus* Lec.

The pitch pine (*Pinus rigida*) gives up a few *Melanotus*, one *Corymbites triundulatus* Rand. and one *Harmonia picta* Rand., which are both rare here. At sunset I have had fine success with a few of these trees at the top of a small hill, taking *Chrysobothris floricola* Gory, *Enoclerus nigrifrons* Say, *Ernobius luteipennis* Lec., *Pogonocherus mixtus* Hald., *Eupogonius tomentosus* Hald., *Corymbites splendens* Ziegl., and *propola* Lec. At another time I found the twigs swarming with *Anomala oblivia* Horn.

The scattered cedars (savins) of the pasture here have never yet paid me for the time spent on them, and I might say the same of live elm (unless one is looking for the elm leaf-beetle), ash, apple, chestnut and, in Maine, the spruce and fir, although I see no reason why the two latter should not make as good hiding places as the pines and hemlocks. It is very probable that the time and place entirely govern success in beating, and while I always give them a stroke or two, elm, apple and cedar are absolutely hopeless to me. The oaks are the most prolific as a whole, but must be visited on sunny days, preferably along towards 5 p.m., as the insects are then less active and can be secured without the losses that are sure to occur by quick flight during the heat of the early afternoon. Among the more interesting things from oaks are: *Chrysobothris azurea* Lec. (dead white oak), *Agrilus masculinus* Horn, *acutipennis* Mann., *auricomus* Frost (red oak), *crinicornis* Horn (raspberry leaves in Maine), *Elytroleptus floridanus* Lec., *Bassareus mammifer* Newm., *Rhynchites aeneus* Boh., *Auletes ater* Lec., *Pierocolus ovatus* Fab., and several species of *Balaninus*.

The rain is now gently falling in fine scattered drops as I stop by the brook to try the young poplars and alders growing thick over a small area near the railroad. The former gives me one *Catalpa lanigera* Linn., and plenty of *Phyllodecta vitellinæ* Linn. At other times I have taken an occasional *Agrilus anxius* Gory, and *Saperda concolor* Lec. with *Zeugophora puberula* Cr. turning up in large numbers twice from poplar. From the alders I now get a single *Dicerca pugionata* Germ., which rounds out a perfect day as I have now taken my second specimen of this fine species. *D. caudata* Lec. is rarely seen resting on the side of the stems of the young alders, from whence it may, sometimes, be knocked into the net or umbrella.

Back along the brook I hasten while the rain increases in intensity with every intermittent shower. I tarry a few moments in the heavy growth of oaks and chestnuts through which the rain has not yet penetrated. Here I bring down *Melanotus castanipes* Payk., two species of Platydema, *Phloetrya liturata* Lec., and *Agriotes oblongicollis* Melsh. in numbers by vigorous kicks against the dead saplings. I once brought down a shower of *Bostrychus armiger* Lec. from a dead white oak sapling by this method; it was in a thick wood

and none of the other oaks near by gave me a single specimen, and I have never happened on them again. In Maine I have beaten the rare *Enchodes sericea* Hald., *Microbregma emarginatum* Duft., *Oligomerus obtusus* Lec. and *Elater apicatus* Say from the dead lower limbs of large sugar maples.

A final kick at a dead stub brings down the whole top smashing into the umbrella with disastrous results and, casting away the now utterly useless implement, I plod along in the pouring rain over the railroad ties towards home. When I arrive there I am soaking wet but happy in the memories of the day's experiences, and each time I open my boxes these memories will be reflected from the shining armor of *Dicerca pugionata* and *Chrysobothris harrisi*.

NOTES ON COCCIDÆ. V. (HEMIPTERA).

BY G. F. FERRIS,
Stanford University, California.

(Continued from Can. Ent., Vol. 51, p 253.)

Genus PROTODIASPIS Ckll.

The original description of this genus was not sufficiently detailed, and much doubt has existed as to its exact nature. Through the kindness of Professor Cockerell I have been enabled to examine a slide mount of *P. parvula* Ckll., the type of the genus, and find it possible to extend somewhat our knowledge of this and related species.

The original description of the genus was as follows: "A genus of Diaspinæ secreting no scale but the females enveloped in cottony secretion, the male pupæ resembling those of Diaspis, but extremely short. No grouped circumgenital glands." To this genus there have previously been referred, (with some doubt) *Protodiaspis anomala* Green, *P. tridentata* Ferris, *P. edentata* Ferris, *P. agrifoliæ* Essig and *Fiorinia syncaripæ* Maskell. Of these only *P. agrifoliæ* Essig can be considered as congeneric with the type, and I am here naming a new genus for the others.

I am unable at present to offer any very precise definition of the genus *Protodiaspis*, partly because of certain possible errors in the original description that I am not able to clear up, partially because of the need of more information concerning the immature stages and partially because of the hazy limits of certain other genera. I present, however, the following characterization, this being based upon *P. parvula*, *P. agrifoliæ* and two other species that I am here describing as new.

Coccidæ referable to the subfamily Diaspinæ, secreting a distinct scale or possibly in some cases merely loose secretion; the scale of the female circular with the exuviæ central, that of the male elongate with the exuvia at one end, in both sexes white; second exuvia of female large but not at all, or at the most only partially, enclosing the adult; tubular ducts (Fig. 1B) of the type seen in *Diaspis* and related genera, all small, those of the pygidium scattered; pygidium usually weakly or not at all chitinized; circumgenital pores present or absent; lobes of the pygidium present or absent. Small species (about .5 mm. long) as far as known infesting only oaks.

Protodiaspis parvula Ckll.

1898.—*Protodiaspis parvula* Ckll., Ann. Mag. Nat. Hist., (7), 1:428.

Material Examined.—Slide mount from the type material, from oak, Mexico.

Notes.—The material examined is not in sufficiently good condition to permit the making of figures or of adding much to the original description. I may note, however, that the insect is apparently very similar to *P. agrifoliæ* Essig, differing chiefly in the absence of circumgenital pores. The dorsum of the pygidium possesses numerous small ducts, as in the latter species. I am unable to detect any lobes. The species is so very similar to *agrifoliæ* that I cannot regard the two as anything but congeneric. As *P. agrifoliæ* has a distinct scale, it appears quite possible that the original description of *parvula* is in error in the statement that this species has no distinct scale.

Protodiaspis agrifoliæ Essig.

Fig. 7.

1914.—*Protodiaspis agrifoliæ* Essig, Journal Ent. and Zool., 6:75–80, figs.

Habit.—Scale of the female white, circular, quite high convex; male, according to the original description, "The exuviæ of the males are yellow, and their position is somewhat distinct from the posterior end. The scales are little more than fluffy, snow-white cocoons, made of fine white cottony material. . ."

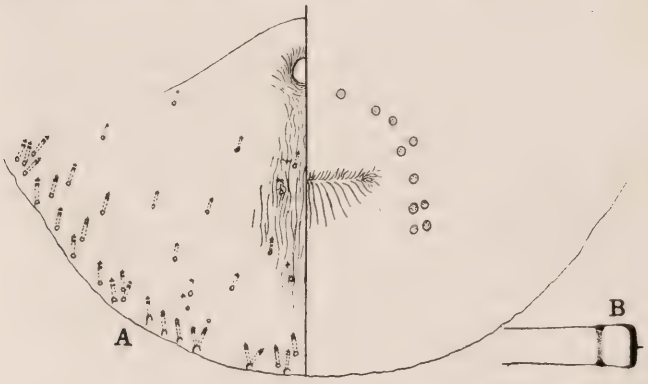

Fig. 7.—*Protodiaspis agrifoliae* Essig. A, pygidium; B, type of duct.

Adult Female.—Length .5 mm., form oval. Derm everywhere membranous except for the anal ring, and a faintly chitinized area immediately about and caudal of the anal orifice. Dorsum of the pygidum (Fig. 1A) with numerous small tubular ducts, and the margin of the body with a continuous narrow zone of such ducts. Circumgenital pores present, arranged in an almost continuous arch of 20–30 pores. There appear to be no gland spines at any point on the body.

Second Stage.—Figured by Essig as possessing small lobes, but in a mount of the exuvia at hand it appears not to differ from the adult.

Notes.—Structurally this appears to be so close to *P. parvula* that there can be but little doubt that the two are strictly congeneric, in spite of the statement that the former species possesses no definite scale.

Protodiaspis lobata, n. sp.

Fig. 8.

Type, Host and Locality.—Taken from an herbarium specimen of *Quercus gambelii*, from four miles east of Santa Fè, New Mexico.

Habit.—Scale of the female as in *P. agrifoliæ*, that of the male elongate, slender, white and non-carinate.

Adult Female.—Length .4 mm., form broadly oval. Derm everywhere membranous, except for a very small area immediately about the anal ring, one or two irregular, very small areas on the dorsum of the pygidium and the lobes. Dorsum of the pygidium with numerous scattered ducts and the margin of the body likewise with a continuous zone of such ducts. Margin of the body also with a practically continuous row of small gland spines. Pygidium with two pairs of small, irregularly-shaped lobes and with two or three pairs of small gland spines. Circumgenital pores lacking.

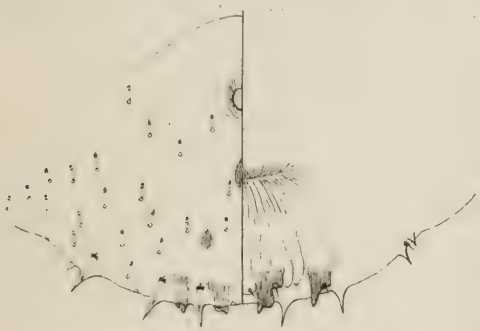

Fig. 8.—*Protodiaspis lobata*, n.sp. Pygidium.

Protodiaspis pulchra, n. sp.

Figs. 9, 10 and 11.

Type Host and Locality.—From herbarium specimen of *Quercus toumeyi*, from Pedestal Rock, Chiricahua Mts., Ariz.

Habit.—Scale of the female as in *P. agrifoliæ;* scale of the male not seen.

Adult Female — Length .5 mm.; form slightly elongate oval or somewhat irregular (Fig. 9A); cephalothorax and pygidium tending to be quite heavily chitinized. Pygidium (Fig. 10) somewhat acuminate, the tip narrowly rounded. Two pairs of lobes present, the inner pair quite close together and widely separated from the outer pair. Outer lobes composed of two lobules, of which the outer is the smaller. Dorsum of the pygidium with numerous scattered and very small ducts. Anal opening closer to the anterior margin of the pygidium than to the posterior, and slightly cephalad of the vaginal opening. Margin of the body with a continuous zone of small ducts, but without gland spines.

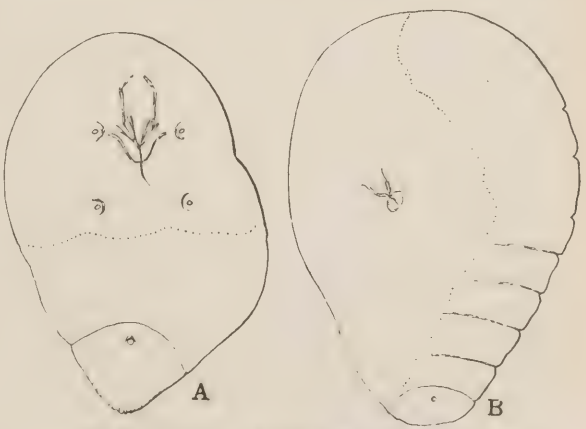

Fig 9.—*Protodiaspis pulchra*, n.sp. A, adult female; B, exuvia of second stage.

Second Stage.—Only exuviæ are available for examination. In these one side is much more heavily chitinized than the other (Fig. 9B). The pygidium (Fig. 11) is short, broad and almost truncate. There are apparently two pairs of very small lobes and the dorsum bears a few very small ducts.

Notes.—This differs rather widely from the other species

Fig. 10.—*Protodiaspis lobata*, n.sp. Pygidium of adult female.

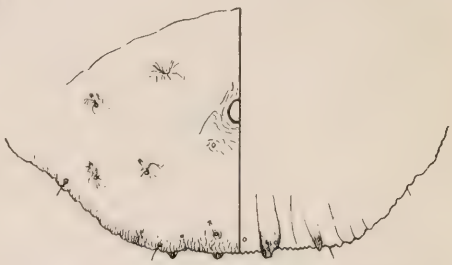

Fig. 11.—*Protodiaspis pulchra*, n.sp. Pygidium of second stage from exuvia.

of the genus, so much so as to complicate the definition of the group, but it may be referred here for the present, at least.

Genus Ancepaspis, new genus.

Coccidæ referable to the subfamily Diaspinæ but in which neither the male nor the female secretes a scale, the adult of both sexes being included within the derm of the preceding stage which becomes heavily chitinized; exuvia of second stage of female dehiscing about the posterior margin to permit the escape of the larvæ; adult female without circumgenital pores, and all stages without tubular ducts either on the pygidium or elsewhere; pygidium of the adult female with the margin more complex than that of the second stage, or at least not less complex. Small species (adult less than 1 mm. long) occurring on hosts of the families *Fabaceæ*, *Mimosaceæ* and *Cassiaceæ*.

Type of the genus, *Protodiaspis tridentata* Ferris[1].

Notes.—In addition to the type, the following may definitely be referred to this genus; *Protodiaspis anomala* Green, *P. edentata* Green and an undescribed species which I shall discuss in another paper. Green has suggested that *Fiorinia syncarpiæ* Maskell and *F. secreta* Green are congeneric with this group, but in both of these species the male is described as having a secretionary scale. I have seen the male of an *Ancepaspis* only in connection with the undescribed species mentioned above, but this species is so clearly congeneric with at least *tridentata* and *edentata* that there can be no question as to the relationship of these forms.

This is a most peculiar group, having but little resemblance to the ordinary Diaspine types. It is probably not related to such genera as *Fiorinia* and *Leucaspis*, in which tubular ducts are present at least in the nymph.

1. *Protodiaspis tridentata* Ferris, Contrib. Knowl. Coccidæ Sw. U. S., p. 46, fig. 22. *In* Stanford University Publications, University Series, 1919.

THE GENERIC POSITION OF SPHINX SEPARATUS NEUM.

BY T. D. A. COCKERELL,
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On Aug. 23, 1918, a strange sphingid larva was found in a tomato patch at 905 Lincoln Avenue, Boulder, Colorado. It was about 110 mm. long, with a diameter of 16 mm.; head black, with a dark red stripe on each side; general colour of body creamy-white, with black and dilute black markings, the under side plumbeous. The caudal horn was small and black. The most conspicuous markings were on the dorsum of thorax, and were large and intense black; consisting of a trilobed or trefoil-like mark behind the head, with a short stem to the anterior margin of the segment, and a much larger broad, elongate mark on the hinder part of thorax, the interval between these markings having a pink suffusion. The thorax also had three round black spots on each side. Beyond the thorax, the dorsum was ornamented by transverse rows of small spots,and laterally by short, oblique, black marks, directed dorso-cephalad, i. e., in an opposite direction from that of the lateral stripes of *Sphinx*. From the caudal horn, however, a short, black band passed anteriorly on each side, homologous with a similarly placed marking in *Sphinx*. In the middle of the body, also, the oblique stripes of *Sphinx* were more or less distinctly developed, as rather short, dark bars, dorsally. A more or less distinct +-shaped mark was behind the larger thoracic patch, and a similar one anterior to the caudal horn.

This peculiar larva, very unlike that of *Sphinx*, produced a pupa in which the maxillary loop is about 22.5 mm. long, not allowing for the curvature, and strongly arched from the surface of the body (distant from it at one point as much as 5 mm.), with the end bulbous. The metathoracic ridge, about 6.5 mm. long, is only very narrowly interrupted in middle, the interval less than half a mm. Dorsally, the abdominal segments are strongly punctate anteriorly. The spiracular furrows are deep and about 4 mm. long, not extending ventrad of the spiracle; excepting, however, the posterior furrow of the first pair, which is longer, and goes ventrad of the spiracle by a distance almost equal to the length of the latter. Pupa is about 53 mm. long; colour dark chestnut red.

Judging from the pupa, and following the characters so admirably presented by Dr. Edna Mosher, this insect should have been a *Protoparce*. The moth, however, is *Sphinx separatus* Neum.! This species does not seem to me to be a true or typical *Sphinx*. The antennæ are curved at the end, approaching the condition of *Protoparce*, and the markings of thorax and anterior wings are very *Protoparce*-like. The black and white lateral banding of the abdomen, and the heavy (coalesced) bands on the hind wings are striking specific characters. On the under side the resemblance to *Protoparce sexta* is quite close. The eyes, in *Sphinx*-fashion, have very long lashes, but *P. sexta* has evident though much shorter ones. Mr. B. Preston Clark, working with the adult insects, kindly tells me that he cannot find adequate grounds for subdividing *Sphinx*, of which he has before him all the known species but two. Nevertheless, in view of the peculiar larva, and especially the characters of the pupa, far more striking than those used to separate the moths of the two genera in question, it seems necessary to regard *S. separatus* as the type of a distinct subgenus or possibly genus. For this I will propose the name *Mesosphinx*.

We have found two species of more typical *Sphinx* at Boulder; *S. drupiferarum* Abb.-Sm., collected by William Winner, and *S. vancouverensis* Hy. Edw., collected by Rosamond Patton.

A PARASITE OF DERMESTID BEETLES IN ENTOMOLOGICAL COLLECTIONS.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO, BOULDER.

In the fall of 1914 a specimen of *Libellula pulchella* was caught at Forest Hills, Mass., and came into the possession of Mr. J. T. Scott, then a student at the Bussey Institution. It was placed in a box which was taken to Lynchburg, Virginia, and there remained 2½ years. For at least a year past it was known that the specimens were infested by anthrenids. About Sept. 5, 1918, the box was received by Mr. Scott at Boulder, Colorado; and on Sept. 15 several small hymenopterous insects were found alive in it. On investigation, Mr. Scott found small, pure white cocoons on the *Libellula*, two upon the wings and two inside the thorax. Anthrenid larvæ were also found, showing evidence of parasitism. There was one Anthrenid larva still alive.

On examination, it was easily determined that the insects were Bethylids of the genus *Lælius* Ashmead. This genus is well known to be parasitic on Dermestid larvæ, and consists of the following species, as far as yet known:

1. U. S. species. *L. trogodematis* Ashm., *L. tricarinatus* Ashm., *L. rufipes* Ashm., *L. nigripilosus* Ashm., *L. fumipennis* Brues.
2. French species, *L. bipartitus* Kieff., *L. tibialis* Kieff., *L. perrisi* Kieff.
3. Italian species, *L. fulvipes* Kieff., *L. anthrenivorus* Trani.

Mr. Scott's insect, which undoubtedly attacked the anthrenids in Virginia, is easily separated from all those of America by the clouded wings and dark legs with red anterior tibiæ. It may be described as follows:

Laelius utilis, n. sp.

Female.—Length fully 3 mm., anterior wing 1,850 microns; black, highly polished, the surface of head and thorax microscopically tessellate, the front with very sparse but large piliferous punctures; wings clouded beyond the middle; nervures dilute fuscous; legs superficially appearing black with bright ferruginous anterior tibiæ, but the other tibiæ and all the tarsi are obscure dark reddish; the legs have sparse, long, black bristles, the tarsi with short, black hair. The abruptly truncate metathorax has the dorsal surface very beautifully ornamented, with fine longitudinal plicæ, three in the median region, and one near each side; there are also shorter plicæ between these, arising from the base; between the median and subdorsal plicæ the surface is minutely cancellate, and beyond the subdorsal plicæ it is very finely transversely striate; the plicæ, except the median one, border a series of large, shallow pits. The apical truncation of metathorax is minutely cancellate, with a delicate median raised line. Mandibles, base of antennæ and trochanters reddish, but palpi dark. Third and fourth abdominal segments minutely transversely lineolate on basal half.

The type will be placed in U. S. National Museum.

NOTES ON SOME SYRPHIDÆ (DIPTERA) COLLECTED IN ENGLAND AND FRANCE DURING 1917–18.

C. HOWARD CURRAN,
Vineland Sta., Ont.

While on military service in Europe a few opportunities for the collection of insects occurred. Such opportunities were not anticipated, and as a result, all the insects taken were captured in the hand, a not very satisfactory, and certainly a very disappointing method in so far as the collector is concerned. However, some thirty-six species of Syrphidæ have been determined, and it is interesting to note that several of these are considered by Verrall (British Flies, Vol. VIII) to be rather scarce in England.

Unfortunately the specimens collected in France, with the exception of a very few, were lost, due to unforeseen circumstances. They were packed away in cotton wool in a tobacco tin, and when my kit arrived from France it was found that all tobacco, including all tins, had been confiscated by my brother officers. Evidently some smoker received a huge surprise.

Naturally, conditions in Europe and America are vastly different as regards collecting. Kent and Sussex, England, I found to be ideal collecting grounds, and many "perfect" localities were found. About twenty acres of flowering shrubs and flowers, dotted with ponds and surrounded by woods, at Horsham, Sussex, furnished most of the specimens collected. At Cuckfield, (near Hayward's Heath), a slashing, with young willows in bloom, was to be found in Diptera. At Hythe, an open woods (out of bounds), in which many flowers were growing proved to be a good place for Syrphids. Less favourable localities were found in other parts of England and Ireland; no collecting was done in Scotland, although observations were made.

In France all the collecting was done about a mile from the coast, near Estaples, in an old shrubbery and a strip of wood adjoining a marsh. Many flies, especially belonging to the Syrphini, were observed on the edges of the trenches, even where gas was used freely. *Syrphus balteatus* was one of these.

General observations seemed to indicate a larger number of common species and a greater abundance of insect life in general.

Two of the genera collected do not occur in North America, and both are very interesting connecting forms. These are marked with a†. Those marked with an asterisk occur in Canada.

Microdon sp. I note a single specimen taken at Le Touquette, France, in June, 1918, because the specimens belonging to the genus are not at all common. It was taken on currant leaves in a narrow strip of woods.

Pipizella virens Fabr. Two females, Horsham, Sussex, early June, on leaves of low-growing plants.

Chilosia illlustrata Harris. A single male taken at Cuckfield, Sussex, late May, in a slashing with young willows growing. The flies were fairly common, sunning on dried leaves on the ground.

Chilosia albipila Meig. Four specimens taken in the same place as the preceding, and also on willow blossoms

**Chilosia variabilis* Panzer. Two females taken at Horsham, Sussex, early June, 1918, sunning on leaves.

Chilosia pulchripes Loew. Male, Hythe, Kent, Aug., 1917, on flowers in wood.

Chilosa vernalis Fallen. Male, Cuckfield, April, 1918, willow slashing.

Melanostoma melinum Linn. Two females from Horsham, early June, 1918, sunning on leaves.

Melanostoma scalare Fabr. Three females, two from Horsham, early June, 1918, one Hythe, Aug., 1917.

**Platychirus peltatus* Meigen. Male and female, Horsham, early June, sunning on leaves.

Platychirus albimanus Fabr. Male, Hythe, Aug., 1917; female, Horsham, June, 1918, male; Cuckfield, April, 1918; the first on flowers, the last two on leaves.

Platychirus manicatus Meigen. Female, Horsham, early June, 1918, sunning on leaves.

†*Xanthandrus comutus* Harris. Male, Hythe, on bloom in open woods, Aug., 1917. This genus is not represented in North America, and the species, which is not common, is its only representative. It is related to *Syrphus* and *Melanostoma*.

**Scaeva pyrastri* Linn. Male, Hythe, Kent, Aug., 1917, on bloom in open woods.

**Syrphus ribesii* Linn. Female, Horsham, June; male, Kilkenny, Ireland, Oct., 1918. This species is not nearly so common as in America.

**Syrphus cinctellus* Zett. Male and female, Horsham, early June, 1918. Possibly occurs in N. America, but not very common in England. Specimens taken in flower garden, on bloom.

Syrphus luniger Meigen. Female, Horsham, June, 1918, on bloom in garden. Belongs to the *arcuata* group.

Syrphus balteatus DeGeer. Seven males and females from Hythe, Kent, in open woods. I also observed specimens in various other places, in England, Ireland, Scotland and France. It appeared to be the most common species of the genus, and was especially abundant near streams and damp places, as well as on bloom.

Sphaerophoria menthastri var. *picta* Linn. Horsham, a single female, taken on bloom in early June. I have also a specimen taken from the class collection at the Ontario Agricultural College, 1913. I doubt if the specimen was taken in Canada.

Sphaerophoria scripta Linn. Two males and a female, from Mr. J. E. Collin, London. Unforunately a large series of this species was not obtained. From a comparison with *S. cylindrica*, I do not think that it is the same species.

Ascia podagrica Fabr. Male and female from Newmarket, Eng., April 4, 1918, taken on leaves of ground plants, sunning. A very small species, and extremely difficult to catch without a net.

Baccha elongata Fabr. A single male, Kilkenny, Ireland, Oct., 1918. I observed this species also at Horsham and found it to be very numerous in France, in rather long grass on the edge of a marsh. I took twelve specimens in half an hour.

Rhingia campestris Meigen. Six males and females, Horsham, early June,

on bloom in deep woods. The species is much like *R. nasica*, Say, but more reddish, and the thorax is darker in both sexes.

Volucella inflata Fabr. Female Horsham, Sussex, early June, in flower garden Fairly common. I also had specimens from France.

**Volucella bombylans* Linn. Var. *bombylans*, male, and female Horsham, early June, and specimens taken in France. Var. *plumata* six males and females Sussex. This species is very common, especially the latter variety, which corresponds exactly to our *V. facialis* Will Our *V. evecta* should be considered a variety of *V. bombylans*.

**Eristalis tenax* Linn A female from Hythe and a male from Kilkenny. I found the species to be common everywhere.

Eristalis pertinax Linn. Eight males and females from Hythe and Sussex. The species is common on bloom and sunning on leaves. It resembles *E. tenax*, but is more slender and more pilose.

**Eristalis nemorum* Linn. Two males Horsham, Sussex, early June. This species, which has recently been recorded from the Maritime Provinces, is common in England. Specimens were taken sunning on leaves, and observed about the edge of a pond.

**Eristalis arbustorum* Linn. A single male from Horsham, early June, 1918. This species is very common in Canada. Williston describes it as *E. brousii*, and it is confused with *E. meigenii*. In England and France I found it to be quite common, but neglected to take specimens.

Helophilus pendulus Linn. Two females from Horsham, early June, on leaves and bloom, and a third specimen, evidently different, from Ireland. I took a large number of specimens of this genus in France, evidently belonging to two or three species.

**Merodon equestris* Fabr. Ten males and females beonging to four varieties: *equestris*, *narcissi*, *vallidus*, and *transversalis*. This injurious species was very common in Sussex, about bloom in gardens. The larvæ bore into healthy bulbs. I recently examined an importation of narcissi, 10% of which were infested.

Criorhina berberina Fabr. Female, Cuckfield, late May, 1918, in willow slashing. It is much like *C. tricolor* of the West Coast, in colour, but structurally different. It is not common.

Criorhina ranunculi Panz. Female, from willow bloom, late May, 1918, Cuckfield. "The most handsome British Syrphid" Verrall. Not at all common; a large, long, black, pilose species, with lighter pile on the scutellum and end of the abdomen.

**Xylota segnis* Linn. Four males and females from Hythe and Horsham. A common species. I observed it on hawthorn and other bloom in various parts of England.

**Syritta pipiens* Linn. A single specimen from Sussex. Equally as common in England and France as in America.

†*Myiatropia florea* Linn. Female, Horsham, early June, 1918. This species, which is the only member of the genus, is fairly common in Britain. It is intermediate between *Eristalis* and *Helophilus*, but appears to be more closely related to the former. The eyes are narrowly contiguous in the male; pilose; marginal cell open. The fly resembles *E. transversus* in markings.

HYPERA NIGRIROSTRIS FAB. IN THE PACIFIC NORTHWEST.*

BY L. P. ROCKWOOD,
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Hypera (*Phytonomus*) *nigrirostris* Fab., is a clover insect of supposedly European origin[1] which, for many years, has been known to occur in the eastern states and eastern Canada. It has been recorded from as far west as Minnesota by Schwarz,[2] the most western point of which I have seen record, except as hereinafter stated. The insect is a very close relative of the Alfalfa Weevil, *Hypera postica*, and the discovery of its parasites in northwestern America is, therefore, thought worthy of record.

In 1916 Professor R. A. Cooley[3] reported this weevil from "one valley in western Montana," where the insect had been present "during the past two years." In May, 1915, the author found adults of *H. nigrirostris* at Bellevue, Wash., on the shore of Lake Washington opposite Seattle. The distribution of this insect in the Pacific Northwest has since been traced by members of the staff of the Forest Grove Laboratory of the U. S. Bureau of Entomology, Cereal and Forage Insect Investigations as follows:—*H. nigrirostris* was found in western Montana by C. W. Creel at various points in the Flathead Valley from Columbia Falls on the Great Northern Railroad to Dixon on the Northern Pacific Railroad, and also at Arlee, Montana, in the Jocko Valley, a short distance south and east of the Flathead Valley. West of the Cascade Mountains it has been found from Vancouver, B.C., on the north (by C. W. Creel) southward through Washington to its southern limits in Oregon at Garden Home in the Willamette Valley, Forest Grove, in the Tualatin Valley and Nehalem on the coast. Mr. Wm. T. Ham, of the Truck Crop Insect Investigations of the U. S. Bureau of Entomology, reports it in correspondence from Orcas Island, Wash., and Longmire's Springs on Mt. Rainier at an elevation of 2,761 ft.

In 1915 and 1916 *H. nigrirostris* was found in fair numbers at Bellevue, Wash. and Olympia, Wash. In 1917 this species was very numerous and doing considerable damager to clover on the grounds of the Western Washington Experiment Station at Puyallup. In the season of 1918 *H. nigrirostris* was discovered for the first time at Forest Grove, Oregon. Only three specimens were found in that locality during the entire season of 1918. It does not seem possible that this insect could have been present at Forest Grove prior to this year, as clover fields of the vicinity had been very carefully watched since 1914. In the season of 1919 the weevils were slightly more plentiful at Forest Grove, but still by no means common. The insects increased in numbers toward the north, that is toward the Columbia River and the Coast Range, beyond which they also occurred on the ocean front near Nehalem, Oregon. Every indication is that the trend of dispersion of the species is from the north to the south.

There is, however, an unusual phenomenon concomitant to this invasion of a new region by a well-known insect. It was stated above that but three specimens of *H. nigrirostris* were found at Forest Grove in 1918. One of these

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1. Webster, F.M., U.S. Bureau of Entomology, Bulletin 85, Part 1, 1909.
2. Schwarz, E. A., Proc. Ent. Soc. Wash., Vol. 9, 1908, p. 114.
3. Cooley, R. A., 14th Annual Rept. Sta. Entomologist Montana, Bull. No. 112, p. 67, 1916.

specimens was a typical *H. nigrirostris* cocoon containing an Hymenopterous cocoon of a kind indistinguishable from that of *Bathyplectes curculionis*, parasite of the Alfalfa Weevil introduced into Utah from Europe. Later this parasite was found in about 50 per cent. of the early cocoons of *H. nigrirostris* at Puyallup, Wash. In 1919 adults of this parasitic species were swept from clover at Forest Grove on two occasions. The parasite was also found to be present at Nehalem on the ocean front, where the weevil larvæ were not very easy to find. This parasite has been determined by Mr. A. B. Gahan[4] of the U. S. National Museum as "*Bathyplectes exigua* Gravenhorst, a European species hitherto not recorded in the United States[5] and apparently without host record in Europe." This parasite, like other members of this European genus, is especially adapted to prey upon the larvæ of Hypera, the young larvæ of which it searches out in their concealed locations in the axilliary buds under the bracts on clover stems or under the flowering heads of clover. Thus we have a highly specialized parasite occurring even on the outskirts of the area infested by its host.

In addition this parasite of *H. nigrirostris* larvæ, a Pteromalid parasite attacking the pupæ within the lacy cocoons was found in fair numbers during the seasons of 1918 and 1919 at Puyallup, Wash., and Auburn, Wash. This parasite also shows a special adaptation for parasitism of Hypera, within the cocoons of which it occurs as naked larvæ or pupæ. However, it is not an active flier like *B. exigua*, and would probably spread more slowly than that species. It has not yet been found on the outskirts of the infested area. This parasite has been determined by Mr. A. B. Gahan as *Dibrachoides dynastes* Forster, a European parasite of the Alfalfa Weevil, *H. postica*, introduced into Utah but never recovered there so far as known to the author. This genus also, according to Mr. Gahan, was not represented in our fauna so far as known, previous to its discovery in Washington.

The occurrence in the Pacific Northwest of these parasites, apparently foreign to our fauna and not as yet found in the east, where *H. nigrirostris* has been known for many years and recently studied,[6] suggests that the invasion of the Pacific Northwest may be from a source different from that of eastern America. It is unusual for highly specialized parasites of an introduced species to become common so soon after the appearance of the host in a new region. It has been shown that *H. nigrirostris* is spreading from the north to the south in the Pacific Northwest. This seems to indicate that the species is really circumpolar in its range, as Schwarz[7] suggests, or that it has come from eastern Siberia by natural dissemination or accidental introduction. In the latter case the weevil was probably introduced by easy stages, such as would not eliminate the parasites, into the northern part of the Vancouveran faunal area of Van Dyke,[8] which he considers includes even the lower levels of the Aleutian Islands and the southern margin of the Alaskan peninsula.

4. My thanks are due Mr. A. B. Gahan for determinations of parasites and kind permission to use extracts from his correspondence.

5. Mr. A. B. Gahan informs me that a specimen determined by him as *B. exigua* was recently reared from a larva of *Hypera punctata* at Mechanicsburg, Pa., by Mr. T. L. Guyton.

6. Herrick, Glenn W. and Detwiler, J.D. "Notes on some little-known pests of red clover," Jour. of Ec. Ent., Vol. 12, No. 2, 1919, p. 206.

7. Schwarz, E. A., Proc. Ent. Soc. Wash., Vol. 9, 1908, p. 114.

8. Van Dyke, Edwin C. Annals of the Ent. Soc. of America, Vol. 12, No. 1, 1919, p. 1.

NEW SPECIES OF SCYTHRIS (MICROLEPIDOPTERA).

BY ANNETTE F. BRAUN,
Cincinnati, Ohio.

Scythris graminivorella, n. sp.

Head and face dark brown with a faint brassy lustre. Palpi dark brown, slightly paler inwardly and at bases of segments. Antennæ simple. Thorax and fore wings clothed with elongate dark brown, faintly brassy scales, and streaked with paler scales which form several more or less distinctly defined spots. There is a small spot on the fold at the basal third, preceding and following which the fold is darker than the rest of the wing surface, due to absence of paler scales; at two-thirds a large, ill-defined spot extending from the dorsal cilia about two-thirds across the wing, and separated from a spot in the apex by a darker unstreaked patch. Hing wings darker than fore wings, purplish brown. Legs dark brown, brassy. Abdomen dark purplish brown above, whitish beneath. Expanse 10.5–12 mm

Type.—♂, Cincinnati, O.

The type and eight paratypes were reared from larvæ on *Hystrix patula*. The mine is an elongate transparent blotch with the entrance beneath* guarded by a broad tube of silk; the larva usually makes several mines. Although the species seems to prefer *Hystrix* as a food plant, I have observed the mines on Canada blue grass, *Poa compressa*. Larvæ collected May 5, produced moths during the first half of June.

The specimen which Zeller mentions in a note following his description of *S. pilosella* is probably an example of this species.

S. graminivorella is most closely allied to *S. imposiella*, but never shows the distinct markings of that species, nor the purplish tinge of thorax and fore wings. The indistinctly marked forms of *graminivorella* resemble the more yellowish forms of *eboracensis*, described by Clemens as *fuscicomella*. In this connection it may be worth while to note that I have bred the uniformly deep purplish black form as well as the yellowish form from larvæ in webs in tops of thistle. A large series of *eboracensis* from Louisiana are all of the dark form.

Scythris confinis, n. sp.

Face and palpi grayish; the palpi outwardly and at tips of segments dark brown. Crown, thorax and fore wings dark brown, slightly streaked with elongate golden brown scales, especially toward apex. A broad, golden brown stripe starts from near base and follows the fold, usually fading into the ground colour before reaching the margin. This stripe is bordered above and below with black, the black border especially on the upper side becoming broader near the wing margin. Hind wings and upper side of abdomen dark brown; abdomen beneath and legs paler, grayish. Expanse 10–12 mm.

Type.—♂ and 35 paratypes, Alameda County, California, May 22, 1908. (G. R. Pilate, collector).

S. confinis is of the same general type of marking as *S. perspicillella* Wlsm., but much darker and differently coloured.

*In *Hystrix*, the leaf blade is twisted near the base, so that the upper surface of the leaf aces downwards.

Scythris interrupta, n. sp.

Palpi dark brown, white inwardly and above except at tips of segments. Head, thorax and fore wings dark brown faintly shining. A gradually broadening white streak follows the fold from base almost to middle of wing, where it often abruptly becomes two or three times as wide. At two-thirds there is a more or less distinct white, elongate spot on the fold. Hind wings with veins 4 and 5 coincident; dark brown, almost concolorous with the fore wings. Legs dark gray. Abdomen dark brown above, beneath gray in the male, silvery in the female. Expanse 10 mm.

Type (♂) and seven paratypes, City Creek Canyon, Highlands, California, May 11.

Scythris ypsilon, n. sp.

Palpi pale yellowish shaded with fuscous beneath. Face pale yellowish. Top of head, thorax and fore wings pale golden. The fore wings are marked with three irregular, oblique white bands. The first of these crosses the extreme base to the dorsum, where it broadens greatly and passes obliquely upwards and outwards, joining the second band near the costa; the second band passes obliquely from the basal third of costa to near the middle of the dorsum, broadening below the fold. The third band extends from the costal two-thirds obliquely inwards to the dorsum, broadening on each side below the middle of the wing, and often enclosing on the dorsum a small spot of ground colour. Sometimes a minute white spot in the apex. Hind wings pale golden with a slight purplish tint. Abdomen pale golden above, anal tuft yellowish. Under side of abdomen and legs pale yellowish. Expanse 9.5–10 mm.

Type (♂) and eight paratypes, Loma Linda, California, June 30, July 11, August 21–31, and October 15. (G. R. Pilate).

Similar to *S. trivinctella* Zeller, but of a paler golden ground colour and with greater extent of white markings.

ENTOMOLOGICAL BRANCH.

Entomologist for Forest Insect Work in British Columbia Appointed.

Mr. Ralph Hopping has been appointed as Entomologist to take charge of the forest insect work in British Columbia, under the direction of Dr. J. M. Swaine, Chief of the Division of Forest Insects, and he commenced duties in December. Mr. Hopping has had a lengthy practical experience of forestry operations and forest insect control work in western forests. He has been attached to the United States Forest Service for twelve years, and for seven years he had charge of insect control work in the National Forests in California. During the war his territory included the States of Arizona, New Mexico and Colorado. Few men have had a wider practical experience of forest insect control operations, and Mr. Hopping is now engaged in planning and supervising control operations for bark-beetle outbreaks in southern British Columbia, where these insects have been responsible for extensive losses in valuable timber during the last few years.

NOTES ON THE WINTER COLEOPTERA OF WESTERN AND SOUTHERN FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY,
Indianapolis, Ind.

During the winter of 1918–1919 I collected from December 1 to February 11, and from March 6 to March 30, about Dunedin on the west coast of Florida.[1] In the interim, February 12 to March 5, I made a trip to Cape Sable and Key West, stopping four days on the way at Lakeland. A number of interesting and a few undescribed species of Coleoptera were taken during the season, and of these, except the Rhynchophora which will be treated elsewhere, the present article deals.

Cape Sable, the extreme southern point of the mainland of Florida, is an interesting place, but as yet a difficult one to reach. I went with a party of land-seekers and tourists from Lakeland to Homestead, via New Smyrna, Palm Beach and Miami by automobile, thus passing clear across the State from west to east and 250 miles down the east coast, a route necessary to avoid bad roads. From Homestead to Long Key, an island 30 miles southeast of Cape Sable, we took a train on the East Coast Railway. At Long Key we were met by a small boat of the Cape Sable Land Co., which makes a weekly trip for mail and supplies from the "Club House" of the Land Co. This club house is located about three miles from the point of the cape proper. In fact, there are three capes or points, the eastern and middle ones, about six miles apart, being occupied to within 50 yards of the water's edge by cocoanut groves which contain about 40,000 bearing trees.

The country about Cape Sable differs much from other parts of Florida' being for the most part a low, flat region devoid of pine, saw palmetto and sand' the three dominant features of the usual south Florida landscape. The soil, or rather the surface, is composed of comminuted limestone and, except along the brackish inlets and sloughs, supports only a prairie-like vegetation of weeds and grasses. The houses, few and widely scattered, are raised high above the ground to avoid the tides which, during hurricanes or violent storms, often cover the country for miles. There is no fresh water, rain water collected in large square surface concrete cisterns furnishing the supply for the settlers. Along the inlets and in the lower depressions are the so-called hammocks, composed of a dense growth of subtropical shrubs and trees among which Spanish bayonet, tall cacti and other thorn-bearing vegetation so abound that collecting has to be done mostly along the margins. A single phrase from my notebook, viz., "a few fair things and a million mosquitoes," was the average record of each day's collecting about the Cape at that season. Late in the afternoon or on sultry days a "million" would be a very low estimate of the mosquito population. Several times they drove me out of the hammocks onto the open prairie where there was a little air stirring but poor collecting.

The net result of my week's enforced stay was, on the whole, disappointing. Of Coleoptera only Rhynchophora were found in any numbers, but of them a

1. See Can. Ent., XLIX, 1917, 137.

number were rare and interesting. I was glad when Thursday morn rolled round again and a start could be made for Key West. A new automobile road is being constructed from Homestead to Cape Sable, so that in a year or two the Cape can be more easily reached.

The island of Key West, where I spent five days, has been visited by many collectors and its insect fauna is well known. The conditions for collecting are, however, poor and growing worse. This is due to the lack of vegetation and fresh water—only a few stunted shrubs and trees remaining on the island. Here, as at Cape Sable, some of my most interesting captures were among the Rhynchophora. However, a Dytiscid, *Copelatus debilis* Sharp, new to this country,[2] was taken, and also a number of the species mentioned on the pages which follow. From Key West I returned to Tampa by steamer, and from there to Dunedin is a distance of only 27 miles.

Pasimachus strenuus Lec. On March 11 I found one of these large Carabids crawling backwards across a sandy roadway in Dunedin and dragging with him a specimen of the bulky Scarabæid, *Deltochilum gibbosum* Fab. The victim was still alive and had evidently put up a strong fight for existence, as both his fore legs and one of the middle ones were wanting. *D. gibbosum* appears to be a scarce species in Florida, having been taken by me but once before, when a half dozen were found in a putrid, extremely fetid mass of fungi in Skinner's Hammock near Dunedin.

Dicælus elongatus Dej. This species, frequent throughout Indiana, is seldom found in Florida. Two specimens were taken February 13 from beneath logs in low woods on the border of Lake Parker, northeast of Lakeland. Heretofore known from the State only by specimens taken by Schwarz at Enterprise, St. Augustine and Crescent City.

Lebia fuscata Dej. Two specimens were beaten from dead leaves of cabbage palmetto near Dunedin, one Jan. 29, the other March 19. It has been recorded from Jacksonville and Belleair, and is said to occur from Canada to Florida and Missouri.

Selenophorus fatuus Lec. Quite common beneath dead leaves near the crematory on Key West. With it were taken *Copelatus debilis* Sharp and *Casnonia pennsylvanica* L., the latter with the black spots of elytra very large and confluent.

Neoharmonia venusta fattigi, var. nov.

Differs from typical *venusta* in having the black markings of each elytron reduced to the two median spots, one round and submarginal, the other subsutural with a narrow prong directed forward. It is thus intermediate between the typical form and var. *dissimila*,[3] the latter having these median spots wholly wanting. Examples of all three forms were sent to me by Prof. P. W. Fattig, of Gainesville, who took them at Pahokee on April 25.

Psyllobora nana Muls. A single specimen was taken March 2 while sweeping near the Old Fort on Key West. It is a Cuban and Jamaican species,

2. See Bull. Amer. Mus. Nat. Hist., XLI, 1919, 312.
3. Can. Ent., XLVI, 1914, 66.

and has been taken by Berger on the Dry Tortugas and the Florida Keys. *P. parvinota* Casey was taken in numbers both at Cape Sable and Key West.

Hyperaspis nigrosuturalis Blatch. Several additional specimens of this handsome Coccinellid, which was described[4] from a unique taken at Lakeland, were collected near Dunedin in February by beating large bunches of Spanish moss in which they were hibernating.

Scymnillus eleutheræ Casey. Three specimens of this minute Coccinellid were beaten from the foliage of the Saffron Plum, *Bumelia angustifolia* Nutt., along the edges of a hammock at Cape Sable. It was identified for me by Col. Casey, who described[5] it from the Bahama Islands, this being its first record for the United States.

Scymnus dichrous Muls. A single specimen taken March 3 by beating at Key West. This species has not before been recorded from Florida, nor definitely from the United States. Mulsant's brief characterization and notes were as follows: "I have seen in the Chevrelat collection, under the name *Scymnus dichrous*, a specimen having the posterior fifth of the Elytra reddish white or reddish yellow, except that the suture throughout is widely bordered with black. Perhaps this specimen which seems to constitute a distinct species, may however be attached to *Scymnus ochroderus*." He gives no locality for *dichrous ochroderus* was from St. Bartholomew, West Indies.

Scymnus bivulnerus Horn. This species was taken both at Cape Sable and Key West. It was described in part from the latter place.

Mychocerus depressus Lec. Two specimens of this, the smallest of our Colydiidæ, were taken Dec. 11 from beneath bark of dead water oak near Dunedin. Horn gives[6] its range as "District of Columbia to South Carolina and very rare." It has not before been recorded from Florida, though mentioned in the Schwarz Mss. list from Tallahassee.

Apsectus hispidus Melsh. I can find no Florida record of this little bristly Dermestid. A single specimen was taken at Dunedin, March 19, from bottled, dead-leaf debris which was kept on account of its containing *Hormops abducens*[7] Lec. The Dermestid is said by Leconte[8] to occur in the middle and southern states on leaves.

Hister adonis, sp. nov.

Elongate-oval, moderately convex. Black, shining. Thorax with two marginal striæ, the inner one almost entire, the outer but little shorter; disk smooth. Elytra with one sub-humeral stria reaching the apex and a very fine, oblique humeral. Dorsal striæ five, entire, the fifth arching and joining the sutural, the striæ well impressed, evidently but feebly punctate; epipleuræ unistriate. Propygidium and pygidium both finely and rather sparsely punctate. Mesosternum truncate. Front tibiæ with four rather coarse teeth, the apical one entire. Length 5.8 mm.

4. Can. Ent., L, 1918, 420.
5. Jour. N.Y. Ent. Soc., VII, 1899, 115.
6. Proc. Amer. Phil. Soc., XVII, 1878, 592.
7. See Journ. N.Y. Ent. Soc., XXVI, 1918, 158.
8. Proc. Acad. Nat. Sci. Phil., VIII, 1854, 113.

Dunedin, Florida, Dec. 13. One specimen taken from beneath a board near the margin of a pond. A member of Horn's Americanus Group, allied to *sedecimstriatus* but larger, more oblong, with two nearly entire thoracic marginal striæ, but one sub-humeral and with dorsal striæ less impressed, less distinctly punctate. Not in the Leconte or Horn collections and not known to Col. Casey.

Saprinus obsidianus Casey. Three specimens of this highly-polished Histerid have been taken at Dunedin, Dec. 21–March 21, one in a bucket of water, the others at carrion traps. It was described from Mobile, Ala., and has not before been recorded from Florida.

Carpophilus rickseckeri Fall. Two specimens were taken by sweeping along the margins of an orange grove near Dunedin, March 17. It was originally described[9] from specimens taken in decaying cactus at San Diego, Cal., and Mr. Fall informs me that he has since seen specimens from Florida.[10]

Quadrifrons castanea Blatch. A second specimen of this very distinct Nitidulid was taken March 7. It was swept from low huckleberry bushes growing within 100 yards of the bay front one mile north of Dunedin. Both genus and species were founded (Can. Ent., 1916, 92) on a unique taken at Dunedin.

Ora texana Champ. Two specimens of this Dascyllid were taken at Dunedin Feb. 6 by beating a bunch of Spanish moss in which they were hibernating. It is the *Scirtes troberti* of Horn,[11] nec. Guer. and has been recorded before only from Louisiana and Texas, though known to Schwarz from Crescent City and Cape Malabar, Florida.

Melanotus parallelus, sp. nov.

Elongate and slender for the genus. Dark chestnut brown; antennæ, legs and last two ventral segments, pale reddish-brown; basal margin of elytra brighter reddish-brown. Antennæ slender, slightly longer than head and thorax, second joint subglobose, less than half the length of third, the latter nearly as long as, but much more slender than fourth. Clypeus flat, its disk coarsely and densely punctured, front margin very broadly rounded. Thorax one-half longer than wide, its sides straight and parallel from the tips of the long, acute hind angles almost to apex; disk rather finely and sparsely punctate, the punctures at middle separated by twice or more their own diameters, on sides distinctly closer, each puncture bearing a long, grayish-white prostrate hair. Elytra at base not wider than thorax, thence faintly but evidently and evenly tapering to apex; disc with rows of close-set rather coarse punctures; intervals slightly wider than the rows of punctures, each with two rows of very fine alternating punctures, each of which bears a long, prostrate whitish hair. Abdomen finely and sparsely punctate, the last segment with more numerous and coarser aciculate punctures. Length 8.7–9.5 mm.

9. Trans. Amer. Ent. Soc., XXXVI, 1910, 124.

10. This is probably the *Carpophilus humeralis* Murry, mentioned by Leng (Journ. N.Y. Entom. Soc., XXVI, 1918, 205) as having been introduced at Oneca, Fla. If so Fall's name is a synonym.

11. Trans. Amer. Ent. Soc., VIII, 102, pl. 1, fig. 15.

This is apparently a common winter *Melanotus* in Florida, having been taken by me at Ormond, Sanford and Dunedin, Feb. 27–Apr. 15. About Dunedin it occurs especially in early spring on the tall scurfy Ericad, *Xolisma ferruginea* Walt. which grows in clumps in very dry, sandy spots. It is especially notable for the long, parallel-sided thorax and peculiar punctuation of the last ventral.

Melanotus perplexus, sp. nov.

Size medium, form moderately slender. Occiput, apical third of thorax, elytral suture and under surface dark chestnut-brown; basal portion of thorax and elytra except suture, reddish-brown; antennæ and legs pale brown. Antennæ stout, strongly serrate, reaching basal third of abdomen, joints one and two very short, subequal, subglobose, the two united less than half the length of fourth, the latter slightly longer than fifth. Clypeus densely and coarsely punctate, feebly concave, its front margin narrowly rounded. Thorax but slightly longer than wide, the centre of its disk notably convex, widest at middle, the sides evidently but not strongly curved; hind angles short, feebly divergent; disk finely, evenly and rather closely punctate; basal third strongly declivent, the concavity between base of thorax and that of elytra very deep and long. Elytra at base as wide as middle of thorax, thence very feebly narrowing to the rather bluntly rounded apex; striæ distinctly impressed, their punctures round, close-set; intervals as wide as the striæ, each with two irregular rows of minute punctures each bearing a very fine, short, white prostrate hair. Abdomen finely and rather closely punctate, the last two segments both densely punctate and pubescent. Length of body 8–8.2 mm.

Dunedin, Fla., June 10, July 5, two specimens taken at light. The colour and short, convex thorax with large, deep basal concavity are the distinguishing features of this species.

Taphrocerus puncticollis Schwarz. I find that I have heretofore erroneously identified this species. It is our largest member of the genus, 5 to 6 mm. in length, bluish-black, the elytra without, or with very faint, pubescent patches, their surface more or less rugose and with strial punctures somewhat confused. A half dozen specimens were taken near Lakeland, Feb. 16, from between the leaf-sheaths and clumps of a saw-grass growing in clumps along the margin of a lake.

Trichodes apivorus trifasciatus Sturm. A specimen of this large and handsome Clerid, taken at Gainesville May 23, is at hand. It was sent me by P. W. Fattig. The species is listed by Schwarz as "very rare" in Florida.

Hydnocera verticalis Say. A variety of this well-known northern form, having the thorax with only narrow lateral and median stripes piceous; head and elytra wholly pale or the former with a faint fuscous blotch on occiput, occurs in Florida. A specimen was beaten from Spanish moss at Lakeland, and another is at hand from Lake City. The species has not before been noted definitely from Florida.

(To be continued.)

RECENT CANADIAN PUBLICATIONS.

(Continued from p. 24.)

FROM LE NATURALISTE CANADIEN:—

Odonates des environs de Saint Alexandre, Ironside, P. Q. By L. M. Stöhr. Vol. XLV, No. 6, Dec., 1918, pp. 81–85. Forty-one species are recorded, of which five are new to the Province of Quebec.

Un probleme entomologique. (Editorial.) Vol. XLV, No. 8, Février, 1919, pp. 116–117. Records the capture of the noctuid moth, *Stretchia plusiæformis* Hy. Edw. at Chicoutimi, a species otherwise known only from western North America.

La guerre aux coquerelles. By P. Fontanel, S. J. Vol. XLV, Dec., 1918, pp. 86-93; Jan., 1919, pp. 104-110; Fév., 1919, pp. 117-126. The habits and methods of destroying cockroaches are described, including formulæ for various insecticides.

Les Coleoptères du Canada. By J. I. Beaulne. Vol. XLV, Nov., 1918, pp. 76–79; Dec., 1918, pp. 93–95; Jan., 1919, pp. 104–110; Fév., 1919, pp. 117–126; Mar., 1919, pp. 140-143; Avr., 1919, pp. 157–160; Mai, 1919, pp. 173-175; Juin, 1919, pp. 186-191; Vol. XLVI, Août, 1919, pp. 45-48; Sept., 1919, pp, 69-72; Oct., 1919, pp. 94-96; Nov. 1919, pp. 117-120. These parts deal with the Hydrophilidæ, Silphidae, Scydmaenidae and Pselaphidae.

La protection des plantes chez les Romans. By Georges Maheux. Vol. XLV, No. 10, April, 1919. An interesting paper, describing the methods employed by the Romans in combatting the ravages of insect enemies of cultivated plants, including cereals, vegetables and fruit trees.

La Lycie vulgaire. By J. C. Chapais. Vol. XLVI, No. 2, pp. 22-27. Notes on the habits, life history, and protective mimicry in the geometrid moth, *Lycia cognataria* Guénée.

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF BRITISH COLUMBIA.—Feb., 1918. No. 12. Systematic Series. Victoria, 1919.

This report of 39 pages contains the following papers and addresses:

Presidential Address.—By E. H. Blackmore. Pp. 5–9. Contains brief accounts of the work of the more active members of the Society.

Life-history of the Leaf-eating Crane-fly Cylindrotoma splendens, Doane (Tipulidæ, Diptera).—By Alfred E. Cameron. Pp. 9–12; 1 pl. An interesting account of the life-history of this peculiar crane-fly, whose larva, unlike those of most Tipulidæ, feeds upon the leaves of various plants, both terrestrial and aquatic, and is protected by its green colour and habit of dropping to the ground when disturbed.

Reared adults copulated in captivity soon after emergence, and eggs were deposited on the undersides of the leaves of potted plants of the false bugbane (*Trautvetteria grandis*). These were reared through to the adult stage. Descriptive notes are given of these stages, the peculiar structure and function of the ovipositor, and other features of the life-history. Detailed descriptions of the egg, larva and pupa of this insect appeared in the Annals of the Entomological Society of America, vol.

Notes on a Collection of Hemiptera.—By W. Downes. Pp. 13–16. This paper is an annotated list of Homopterous insects of the families Cicadidæ,

Cercopidæ, Membracidæ, Cicadellidæ and Fulgoridæ, taken chiefly by the author in the vicinity of Victoria and on the Saanich Peninsula to the north of the city, though a few were collected in the Okanagan District. Dates of capture are given for nearly all the species. The list numbers 61 species, and as little is known of the Hemiptera of British Columbia it is a welcome contribution to our knowledge of the subject.

A Revision of the British Columbia Species of the Geometrid Genus Hydriomena Hub.—By E. H. Blackmore. Pp. 19–26. This paper gives a brief review of recent work on this genus, leading up to its present clearly defined status; followed by notes on the characters of recently-described species from British Columbia, with particular reference to the form of the uncus. Figures of this structure are given for 16 species and varieties. Of the 68 species described from North America north of Mexico 20 have been taken in British Columbia, and 18 of these are reported from Vancouver Island. The paper concludes with a complete list of the British Columbian species.

Notes on the Aeolothripidæ.—By R. C. Treherne. Pp. 27–33. A valuable synopsis of this family, which is the most generalized of the order Thysanoptera. Notes on the taxonomic position of the family are followed by keys to the subfamilies, genera and species. There are 7 genera and 16 species discussed, 9 of the latter belonging to the genus Aeolothrips. Characters other than those of the wings are used, on account of the occurrence of brachypterous forms in some of the species. Antennal and wing characters of the species of this genus are illustrated. Unfortunately there are no references to distribution of the species.

Three Years Collecting in the Lillooet District.—By A. W. A. Phair. Pp. 34–36. Describes a collecting trip to the summit of Mount McLean with the main object of capturing *Oeneis beani*, in which the author was successful. On this and subsequent trips a number of other interesting alpine Lepidoptera were taken. The mountain is described as a remarkably rich collecting ground and is easily reached from the town of Lillooet.

Natural Control Investigations in British Columbia.—By John D. Tothill. Pp. 37–39. Mr. Tothill, whose work on the natural control of the Forest Tent Caterpillar and the Fall Webworm in New Brunswick is well known, investigated these insects in the West in 1918. The Forest Tent Caterpillar was studied at Red Deer, Alberta, where a serious outbreak has been in force for three years, and in the Lower Fraser Valley, where conditions are unfavorable for the insect. In the former locality the parasites which usually serve to bring this insect under control, were not found, but in the Fraser Valley and on the lower end of Vancouver Island these parasites were present in numbers, preying upon the Western Tent (*M. pluvialis*); and the author suggests that it would be well worth while to collect these for liberation at Red Deer.

An undescribed Tachinid related to Compsilura is the most important factor in the control of the Fall Webworm in British Columbia, and attempts will be made to introduce it into the region east of Winnipeg.

The mite *Hemisarcoptes malus*, the most important single factor in the control of the Oyster Scale in the Eastern Provinces, but which has been unknown in British Columbia, has been liberated at several points in this Province, and will be kept under observation for the next few years.

Mailed February 28th, 1920

PHYCIODES BATESI REAK., AND *P. THAROS* DRURY.

(See p. 59).

The Canadian Entomologist

VOL. LII. LONDON, MARCH, 1920. No. 3

POPULAR AND PRACTICAL ENTOMOLOGY.

A SOLDIER'S COLLECTING DAY IN FRANCE.

BY RICHARD T. GARNETT,
Oakland, California.

We were stationed away back of the lines but when they were putting over a big drive we were busy handling supplies, so that I was not sorry when a lull came that allowed me a day off.

I was stationed in the heart of Burgundy at Beaune, near the edge of the little range of hills known as the Cote d'Or. Here the forest-covered hills come down to meet the town, and it was to these hills that I made my way on this particular morning.

I had hardly started out the Faubourg when what should I find sitting on the sidewalk but a splendid specimen of *Lamia textor* Linné. This longicorn resented my grasping propensities very much and tried his best to bite a piece from my thumb. A little more and the town Octroi or limits was past, and on turning over a stone a fine large specimen of *Carabus coriaceus* Linné was acquired. In like manner under a neighbouring rock were picked up three more of the same and two *Carabus violaceus* Linné. Decidedly the species were well known, but they had charm for me as it was a new hunting ground. *Carabus auratus* was soon added to my list of discoveries, and it was not long and I had a fair series of each. A little further on I came to an apple tree with a little fruit on it. In response to a hearty shake of the tree I was rewarded by several hundred lively specimens of *Melolontha vulgaris* Linné, who "possumed" dead long enough for me to gather all I wanted, and then took wing. The leaves of this tree I found on closer examination were in a sad state of dilapidation due to these ravenous Scarabs.

A little bit further on I found several *Cetonia aurata* Linné, and a great many *Cetonia hirtella* Linné upon the flowers of mustard. A rose in a nearby garden yielded from its heart a *Trichius fasciatus* Linné. A few stones on the hillside yielded several specimens of *Pterostichus vulgaris* Linné, and a little further on a single rock provided cover for at least thirty specimens of that pretty little Bombardier, *Brachynus plagiatus* Reiche. Continuing this sort of collecting I soon added some more *Carabus auratus* Linné to the bag as well as several *Abax ater* Vill. and *A. parallelus* Dftsch.

On coming to a fallen log in a moist condition I removed from their snug position beneath the bark a series of *Uleiota (Brontes) planata* Linné, and several *Hispella atra* Linné. A little further on some manure yielded a pair of *Geotrupes sylvaticus* Panz. and one *G. stercorarius* Linné as well as several Staphylinidæ unknown to me. A little further on I captured as it ran along on the edge of a pine grove a fine specimen of *Carabus marginalis* Rz, a very lively and speedy runner. This pine grove was exceptionally well cared for, all fallen limbs and

undergrowth being kept cleared out, so that outside of a few specimens of Carabidæ I got nothing there for my pains.

A little further on beneath a very old log my patience was rewarded by three specimens of *Lucanus cervus* var. *capra*—the variety with the short mandibles in the male. I later took the typical form, *L. cervus* Linné flying at dusk in the outskirts of Paris. Both of these latter I took at the same place exactly, the female one evening and the male the following evening. Both were on the wing, and I was attracted by their buzzing flight.

But to continue my history of this my first day in a new field, I proceeded on until mid-afternoon finding many old friends in a live condition more interesting than they had been in my collection. Everywhere on the deciduous trees were to be found swarms of *Melolontha vulgaris* and an unknown little weevil which also defoliated. I was just putting a pair of *Clivinia fossor* Linné into my vial when I noticed that the sun was low, and as I had to be on duty again at seven that evening it behooved me to hurry a little and return.

Thus closed my first experience in a strange land, and how I gloated over them when I packed them away that evening.

A REMARKABLE CASE OF HOMING INSTINCT. (HYMEN.)*

BY C. N. AINSLIE,
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August 31, 1919, was hot, dry, dusty and windy in Mandan, North Dakota, where the writer was spending the day. The wind was from the west, gusty, and at times almost reached the velocity of a gale.

Late in the afternoon as the writer was returning from a stroll, a flash o-green from the grass beside the walk attracted his attention. A brief investigation disclosed the fact that a lady Sphex (or Ammophila)* had secured a green lepidopterous larva more bulky than herself and was trundling along with her prey swung beneath her body, one end of the larva being held in a firm grip by her jaws, the other supported in some manner by her legs. Its weight was clearly greater than that of the wasp herself, but she was evidently fresh and moved quite briskly at first.

She came out almost at once upon the cement walk that was being swept by the wind. When she felt its force she adopted the policy of least resistance and drifted before it for at least twenty feet eastward, running, walking and hopping in an effort to maintain her balance. For the time she was helpless. Finally she hove to and headed directly into the wind, going due west. Her progress was of course slow, but she persisted and managed to struggle along for a distance of about fifty feet, with occasional pauses for rest.

During this journey her prey must have shown signs of returning animation for at one point she stopped, adjusted her burden and, arching her slender waist, aimed her ridiculous little bulb of an abdomen directly downward. A few swift stings reduced her helpless victim to absolute submission, and during the remainder of the performance she had no more trouble of this sort.

After moving nearly fifty feet directly into the wind she seemed to realize

*Published with the permission of the Secretary of Agriculture.
*Determined by Dr. H. T. Fernald, of Amherst, Mass., as *Sphex vulgaris*.

something wrong and wheeling about went careering down the walk, driven by the breeze to the east. She slowed up as much as she was able, but just as she reached her former turning point an unkind gust struck and upset her, compelling her to let go of the worm while she struggled to her feet. The worm was carried half a yard beyond her and left in plain sight on the walk. She was bewildered for a few moments, then began an agitated search for the lost prize. Her eyesight was evidently of little use, for at first she walked about in an aimless manner but was soon travelling in circles like a dog locating a scent. As this produced no results she rose to wing and sailed above the walk, her long legs just trailing the surface of the cement as she flew. The circles gradually grew larger and she varied flying with running, always keeping close to the surface. The search appeared to be hopeless when all at once, in one of her wider sweeps, she managed to stumble across the outstretched worm. Instantly she straddled it, grasped it with her jaws and again headed west into the wind. Just why she spent so much valuable time chasing up and down this walk will always remain a mystery for, as subsequent history shows, she was merely wasting time and getting nowhere. But the facts are recorded as they occurred.

This excursion took her fully seventy-five feet into the wind, and she walked, hopped, ran and flew in short flights as if in haste to arrive somewhere. At brief intervals a short rest was taken, for the muscular exertion must have been tremendous in the teeth of the gusty wind with the load she was carrying.

Once more, and for the last time, she turned squarely about and headed east. She blew along in spasmodic fashion, now fast, now slow, seldom pausing even for an instant. At times she would run headlong for a yard or more, her abdomen held high in air and her long legs racing. Then she would make leaps of a foot or more, several in succession, then perhaps drag herself wearily along for a few steps as if tired out. For a hundred feet she drove with the wind to the east. Then, in some unknown way she got her bearings and turned directly into the grass lawn, moving south. This was really the most trying part of her entire trip, for although she was out of the wind she was at once involved in a jungle of tangled, close-clipped grass tufts through which she had to thread her way. Necessarily her route was far from being an air line since she had to accommodate herself to the surface obstructions and go around where she could not go through. This fact of itself must have embarassed her in finding her destination, at least a human, like you or I, would undoubtedly have lost our way under similar conditions. But she kept steadily on, followed as closely by the writer as was deemed wise, although she appeared oblivious of his presence during the entire episode.

During her lawn journey she was first in the shade of one house, then of a second. Each time she emerged from the shade she topped and stretched herself in the grateful warmth before continuing. The second time she did this she released her victim and walked away a few steps. Returning, she almost immediately straddled the prize to pick it up but had evidently made the mistake of changing ends, for she promptly reversed her position and then seemed satisfied. Up to now she had been going mainly south but all at once changed her course and went southwest as if she were steering by some invisible star, and from that time until she reached her destination, held consistently on this new quarter. The vicious wind that blew directly across her line of march

precluded any theory of scent affording any aid to the wasp in reaching her burrow, and she certainly could see no landmark to assist her in steering her way.

Once an active grasshopper came bounding across her path and forced a change en route, a detour of a few inches. Later, another hopper, sitting in the grass near her route caught sight of her as she toiled toward him. With baleful eyes he glared at her, swung slowly about as she came closer and just as she passed him made a short, spiteful spring directly at her, giving her a violent kick and upsetting her completely. It was coarse comedy on his part, but might have proved tragedy for her. She meekly righted herself and trudged steadily on. Still further along, another wasp of the same species as herself crossed her track at right angles just ahead of her. She saw the newcomer, stopped short and flattened herself to the ground for a few seconds until her fellow raider had passed on.

At last, after crossing two lawns, two concrete walks leading to the houses she had passed, and going some distance into a third lawn, making fully one hundred feet of grass travel, she swung sharply at right angles and made a rapid run of about two inches. She was all animation now, dropped her load, jumped forward and seized in her jaws a pebble that lay before her. Its removal disclosed an opening in the earth down which she instantly plunged, to reappear almost as suddenly. The worm was grasped and dragged beneath the surface quickly. Twice more she came to the top and, sad as it seems, was captured the last time for the writer's cabinet.

This wasp with her heavy load had travelled in all more than 300 feet, had apparently lost her way at first yet had in some mysterious manner succeeded in steering herself with uncanny accuracy to her destination. How did she do it? It is possible but not probable that she had already been over the same route on foot and was merely following her own scent. But she appeared to enter the lawn in a haphazard manner, and any well-laid plans she may have had must have been much interfered with by the annoying wind as well as by the unexpected obstacles she encountered along the way. The mouth of her burrow was many feet from any prominent object that might have served as a landmark to guide her, and for nearly half an hour she was involved in a grass forest from which she could have seen but little of the outside world. All the while she acted as if absorbed in the petty details of the journey, but she must, in spite of this, have been feeling her way in some exceedingly definite direction and this super-sense, call it instinct or what you will, brought her to precisely the right spot.

These facts are a transcript of notes that were continuously recorded while following the wasp, and are neither coloured nor altered to make a good story.

At the recent meeting of the American Association for the Advancement of Science, held at St. Louis, the Council unanimously elected Dr. C. J. S. Bethune, Professor of Entomology at the Ontario Agricultural College, Guelph, a Fellow Emeritus "in recognition of his long and faithful membership."

Dr. Bethune has also been made an Honorary Life Member of the American Association of Economic Entomologists "because of his long membership in the Association and as a slight token of its appreciation of his work in Entomology."

OBSERVATIONS ON THE MORE COMMON APHIDOPHAGOUS SYRPHID FLIES. (DIPT.).

BY C. HOWARD CURRAN,
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During 1913 at Guelph, 1914 at Orillia, and 1915 and 1919 at Vineland, the immature stages of many species of Syrphidæ, but more especially the aphidophagous or aphid-eating forms, have been studied by the author. As the study of these flies is of considerable interest to the fruit grower and gardener, owing to their beneficial habits, the observations made chiefly concern such species as were found to be of the greatest economic importance

Species belonging to four genera, Syrphus, Allograpta, Sphærophoria, and Paragus have been especially studied with the view of obtaining information as to their importance in the natural control of aphids injurious to farm crops. No suggestion is made here that any one species is of greater importance than another, although it is quite evident that the species discussed are of more importance than others, due to the fact that they are, for the most part, very common.

It has been found that Syrphid larvæ of all species are more or less heavily parasitized, some years much more severely than others. During 1919 parasites were over twice as numerous as during 1915.

Difficulties occur in the study of these larvæ, such as the almost complete absence of food at some periods of the year. Thus, during the past season, Syrphid larvæ were particularly numerous on small aphid colonies early in the summer, but it was found to be impossible to secure sufficient aphids for food, as some species cannot thrive, except on a particular type of aphid. But during the early part of the past season even general feeders, such as *Syrphus americanus*, could not be reared successfully.

The eggs of aphidophagous Syrphidæ are laid singly on the leaves or stems of plants, either in or near an aphid colony. They are creamy-white, but in many cases become grayish after one or two days. They vary in size according to the size of the fly.

The larvæ are more or less flattened beneath, without true legs, and often with fleshy, spine-like protuberances. They vary in shape, colour, size and convexity, according to species.

The pupæ of our common species resemble each other to a considerable extent. Pupation, however, may take place either in the soil, or on the plant. In one case, at least, it occurs in either place.

The more important species are dealt with regarding their feeding habits and abundance.

Allograpta obliqua Say. This is one of our most common syrphus flies and is common during the whole season, from May until October.

The larva is a very general feeder, having been found during the past season on *Aphis brassicæ*, *A. rumicis*, *A. cardui*, *A. pomi*, *A. gossypii*, *Myzus cerasi*, *Macrosiphum*, sp. on wild lettuce (*Lactuca canadensis*) and *Macrosiphum* sp. on wild aster (*Aster* spp.).

On all hosts except *Aphis pomi* this species was very abundant. In the

case of *A. pomi* the aphids were usually too much exposed to the direct rays of the sun to afford the shelter required by syrphid larvæ. On *M. cerasi* and *A. brassicæ* it was exceedingly common and a very important check. About 50% of the larvæ were parasitized during last year.

Sphaerophoria cylindrica Say. An exceedingly common species, found in abundance from early May to early November. The larva is a general feeder, but prefers aphids found on low-growing plants. It and the larva of *A. obliqua* are very similar, and without close examination are ordinarily considered as the same species. They are found on the same plants as the preceding, and the remarks on that species apply here also.

Syrphus americanus Wiedemann. Is a well-known member of the family. It is common in orchards and gardens, especially where plants are infested with aphids. During 1919 the larvæ were found feeing on *Aphis brassicæ*, *A. rumicis*, *A. cardui*, *A. pomi*, *A. gossypii*, *Macrosiphum* sp. on wild lettuce, and *Myzus cerasi*.

The larvæ are quite common on all the hosts mentioned above. It is of considerable economic importance as a check of aphids attacking cultivated plants and fruits.

Syrphus ribesii Linné. Larvæ found attacking: *Aphis brassicæ*, *A. cardui*, *A. pomi* (apple and pear). *A. gossypii*, *A. viburnicola*, *Myzus cerasi*, *Eriosoma lanigera*, *Macrosiphum pisi*, and *Macrosiphum* sp. on wild lettuce.

Syrphus ribesii is probably the best known member of the family, and is very common in orchards and gardens. Unfortunately this species and others are frequently mistaken for bees, and are often killed in mistake for such. It is probably the most important species in the orchard, where it occurs in moderately large numbers throughout the season from early May to November, attacking especially *Aphis malifoliæ* and *A. pomi*, and to some extent, the Woolly Aphis of the apple. It is the most common species attacking currant aphids, and is usually very common during October on Viburnum, where the larvæ attack the return migrants and sexual females of *Aphis viburnicola* and *A. rumicis*.

The larvæ are also found in large numbers in vegetable gardens on cabbages, etc., which are infested with aphids. They usually prefer well-shaded places, such as curled leaves or dense foliage, but are often found in more exposed positions.

Syrphus torvus Zetterstedt. Is an extremely important species. During the first warm days in spring the adults emerge and eggs are laid on the first colonies of aphids appearing on the shoots of various plants. The young larvæ develop on clusters of stem mothers and often wipe out whole colonies. Again in the autumn it preys upon the return migrants and sexual females, in addition to living upon summer forms of aphids upon various plants.

Paragus tibialis Fallen is rather common in Ontario. The larvæ are enemies of the pea aphis (*Macrosiphum pisi*), but I have observed them more frequently attacking *Aphis cardui* on thistle.

Paragus bicolor Fabricius is similar in habits to the preceding, but is much less common.

Observations on the Number of Aphids Destroyed by Syrphid Larvæ.

In order to obtain specific data on the number of Aphids destroyed by a single larva during the larval stage, newly-emerged larvæ were isolated on plants and a count kept of all aphids consumed. This was done by adding fresh aphids each day, in the numbers likely to be eaten. No count was kept of the aphids which were born on the plants, but these would not be numerous. However, it may be taken for granted that the figures given in the accompanying table are slightly below the average, although they are the average of numerous experiments conducted.

TABLE SHOWING DURATION OF IMMATURE STAGES AND NUMBER APHIDS DESTROYED.

Species	Number of Exp'ts	Duration of Egg Stage	Duration of Larval Stage	Duration of Pupal Stage	Average Total Aphids eaten by one Larva	Average Daily Consumption
		Days	Days	Days		
Allograpta obliqua	9	5-10	12-20	5-13	265	17
Sphaerophoria cylindrica	8	6-12	16-27	5-10	530	24
Syrphus americanus	10	5-12	8-11	8-15	474	47
S. torvus	5	——	14-20	10-20	242	15
S. ribesii	8	6- 8	14-24	12-24	312	19

Note.—The larvæ were fed upon Aphis pomi and A. malifoliæ in these experiments.

As shown by this table there is considerable variation, between species, in the total average number of aphids destroyed, and in the average daily consumption.

It may be noted that the number of aphids eaten or destroyed by a larva will depend, to a great extent, upon the abundance of food and the size of the aphids. In the field it was found that where food was very plentiful, the larvæ often killed two or three aphids in succession, but did not suck them dry. Also, in such cases, the larval and pupal stages appeared to be of shorter duration. As the development of the larva depends to a very great extent upon the abundance of food, it is safe to state that such abundance stimulates the insect to more rapid maturity. This fact was clearly demonstrated in the insectary, as the duration of both the larval and pupal stages was markedly shorter in cases where larvæ were reared on aphid colonies, rather than upon a certain number of aphids per day.

Again, the time of the year has a great effect upon the development of the larvæ. In warm weather growth is much more rapid. Larvæ feeding upon colonies of stem mothers are of more importance than those feeding upon summer colonies, as the stem mothers are more productive, and their destruction means that for each one destroyed, possibly millions of aphids will not be brought into the world, as each stem mother is the progenitor of inestimable numbers.

This brief outline of one phase of the work on the immature stages of Syrphidæ merely furnishes the basis for further extensive work. It might be pointed out that besides the determination of the economic value of the various species, considerable information on the systematic classification of the various species and genera is obtained from such investigations.

NOTES ON THE LIFE-HISTORY OF PHYCIODES BATESI REAK. (LEPID.).*

BY J. MCDUNNOUGH, PH.D.
Entomological Branch, Dept. of Agriculture, Ottawa.

Phyciodes batesi Reak. is one of the specialties of the Ottawa district. Like *Plebeius scudderi* it extends eastward from Manitoba through northern Ontario into Quebec and thence down the White Mountains, Adirondacks and Alleghanies into Virginia; although widespread it is apparently, for some unknown reason, restricted to a few isolated localities; further intensive collecting may, however, show that it is more common than we think and that its apparent rarity is due to the fact that it has been confused with *tharos*. I first made its acquaintance in the spring of 1918 when visiting Ottawa for the purpose of arranging the National Collection of Lepidoptera; noticing local specimens of this species in the collection I enquired where they had been obtained, and learned from Mr. A. Gibson that the species was rather common at Queen's Park, Aylmer, a summer resort about twelve miles up the Ottawa River and situated on the Quebec side. I was fortunate enough during the last week of May to obtain a good series of freshly emerged males, no females being obtained until nearly a week later, during the early part of June. The species was extremely local and frequented the lower dry slopes of a small ridge which at this point parallels the Canadian Pacific Railroad tracks; the area in question was adjacent to a wood but was itself rather open and covered with a miscellaneous growth of small bushes and plants among which a species of *Aster* with heart-shaped leaves was quite conspicuous. The same year stray specimens were taken at Chelsea, Que., on the Gatineau River, and other adjacent localities, but nowhere, except at Aylmer, did the species appear in any numbers.

This past spring (1919) *batesi* was even more numerous than in 1918 at its haunts in Aylmer, and by confining several females in a glass jar containing plants of the above-mentioned *Aster* species I was successful in securing a large batch of eggs. I further discovered a colony of freshly emerged larvæ on the same food plant at Aylmer. The ova laid in confinement on June 7th hatched on June 18th; the first pupa formed on July 14th and emerged on July 22nd, the remaining larvæ pupating during the following fortnight and emerging in due course, the last date of emergence being August 10th. Of the batch of young larvæ found in the open only about one-third fed up, pupated and reached the adult stage; the remainder stopped feeding after the third moult and remained quiescent in some secluded corner, evidently preparing for hibernation. It seems evident, therefore, that under natural conditions *batesi* (in the Ottawa region at least) is normally single-brooded with a partial second generation occurring under favourable conditions. That the ova laid in confinement all produced adults in the same year is probably due to the fact that shortly after being deposited they were subjected to intense heat, the jar in which they were contained having been left for a whole morning in a very hot sun.

As is only natural, the larvæ of *batesi* are very closely allied to those of *tharos;* in one feature, however, they appear to show a distinct difference, viz., that in their early stages, up to the third moult, they live gregariously on the

* Contributed from Entomological Branch, Department of Agriculture, Ottawa, Canada. March, 1920

underside of the leaf in a fine web, whereas Scudder emphatically states of *tharos* (Butt. New Eng. I, p. 637) that "not the slightest web of any kind is spun." With regard to the adults they are, in the male sex at least, quite readily separable from *tharos;* apart from the fact that they appear at least ten days earlier on the wing than *tharos* in this vicinity, the narrowness of the orange-banding on the upper side of both primaries and secondaries is quite characteristic; a comparison of our figures 2 and 6 will show that in *batesi* the first extra-discal row of spots is well separated by the black ground colour from the following series of spots, whilst in *tharos*, especially on the secondaries, there is a strong tendency for the two rows to coalesce; in *batesi* this same inner row of spots on the primaries is distinctly paler in colouration than the remaining orange spots, a feature which, to my mind, throws the species into the *campestris—camillus* group, in fact, I have little doubt that *batesi* is the eastern representative of the West Coast *campestris*. On the underside of secondaries the male of *batesi* almost entirely lacks the dark semicircular patch so characteristic of *tharos* (vide figs. 4 and 5). In the female all these points of distinction fail to a greater or less degree and individual specimens are often extremely difficult to place correctly. Up to the present time nothing regarding the life-history has, to my knowledge, been published: I therefore append a more detailed account of the various stages.

Ovum.—Very similar to that of *tharos* (according to Scudder's description); pale green, conical, with truncate apex, base slightly rounded. The lower half of the sides and the base covered with numerous small, slightly depressed, hexagonal cells; upper half with about twenty vertical ribs, slightly raised. Surface of the truncate apical portion very faintly reticulate, almost smooth Height .66 mm., width of apex .2 mm. Greatest width (at about 1/3 height), .5 mm.

Larva.—Stage I. Head black-brown, broader than first segment, with lobes well rounded and divided posteriorly; hairs short, whitish. Body pale ochreous (greenish after feeding) with long, single, whitish hairs arising from minute tubercles. Prothoracic plate slightly darker than surrounding integument, broad, lunate posteriorly, with the lateral anterior edges forming a slight angle centrally at their junction point. Along the anterior margin six hairs overhang the head, three on each side of the centro-dorsal line; subdorsally on the posterior margin are two additional hairs. On the abdominal segments tubercle I is situated subdorsally about the centre of the segment; its long white seta is inclined forward. Tubercle II is well laterad to I and near the posterior margin of the segment; its seta is very short and points slightly backward. Tubercle III, situated centrally on the segment, bears a long hair similar to I, curving outward and forward; IV is slightly nearer the posterior margin of segment than III, V is in line with III, each with a fine white seta, directed outward; VI and VII represented by single hairs near the base of prolegs. In late stages of this instar the incipient spines of the following instar may be seen as large round disks which do not coincide in position with the primary tubercles. Length 2 mm.

Stage II. Head black, small, with rather sparse long hair. Body pale ochreous with greenish tinge. The primary tubercles have disappeared and the customary spines are now present. Prothorax without spines but with

well-developed dorsal plate containing six long, black hairs on anterior margin, overhanging the head, and two hairs on the posterior margin; several very short secondary hairs are also interspersed; laterally, on prothorax, a small hair ventrad to the plate and a raised tubercle with central long hair and several short ones on the lateral flange. Extending from the first abdominal segment is a centro-dorsal row of spines, each spine with terminal long hair and about seven others at various heights on it, decreasing in size as base of spine is approached. A subdorsal row of spines extends over all the segments but the prothorax, the spines being noticeably larger on thoracic segments, each with terminal hair and 11–14 others between apex and base: a similar supra-spiracular row is present with rather fewer hairs on each spine; a subspiracular row is found on abdominal segments only, being represented on the thoracic segments by two small hairs. A tuft of hairs placed on a small tubercle is found at the base of the legs and prolegs. The length of the spines is about equal to the width of the segments. Length 3½ mm.

Stage III. Head black-brown, with pale front (clypeus) and mouth parts; the apex of each cheek (epicranium) is well rounded and the central suture deep; on each lobe a pale stripe is present extending downward from apex to a point midway between mouth parts and apex. Body green, with very prominent white spines thickly covered with black-brown hair; the supra-spiracular spine is preceded by a lunate patch of brown at its base, best defined on the posterior segments. In late stages the dorsal and lateral lines turn dirty brown and a pale subdorsal line crossing the spines is evident. Length 4½ mm.

Stage IV. Head as in preceding stage. Body varying in colour from deep muddy brown to pale greenish brown with rather broad subdorsal and subspiracular creamy lines. Spines paler than the integument, thickly covered with brown hairs. At times the dorsal area is distinctly paler than the lateral area between the subdorsal line and the spiracle and generally the spiracular area is paler than the preceding lateral rows. Distinct tubercles are present along the anterior edge of the prothorax. Length 6 mm.

Stage V. Head black; apical two-thirds of front (clypeus), a streak across the clypeus, a semicircular area extending on cheeks from palpi around and above the eyes, and a vertical band from apex of cheeks to centre of same, white. Eyes white, situated on a black patch. Body deep purple-brown, the spines generally somewhat paler, arising from a white base; at times the supra-spiracular row is deeper in colour than the integument. Over the whole surface minute white spots are scattered, most numerous in the spiracular area, giving the appearance of a broad, pale, spiracular band; a pale subdorsal line, a faint supra-spiracular one and a very distinct subspiracular one; in late stages traces of orange at the bases of the subdorsal spines appear. Length 10 mm.

Stage VI. Head as in preceding stage, the extent of the lateral white area at base of cheeks rather variable. Body much as before with narrow, well-defined, pale yellow, subdorsal and broader subspiracular bands. Spines arising from a pale base and with white tip; hairs black-brown. Spiracle black; legs black; crotchets of prolegs arranged in a double row. Length 21 mm.

Pupa.—(Figs. 8–10). Ground colour pale creamy, but so thickly veined with brown and purplish as to appear superficially pale brown with whitish shadings. Shape much as in Scudder's figure of *P. tharos;* apex slightly truncate,

the lateral edges above the eyes pointed. Mesothorax crossed by an oblique lateral ridge terminating in a small tubercle representing the subdorsal spine of the larval stage; wing sheaths in the thoracic area bordered by a sharp irregular ridge. Transverse ridges cross the dorsal anterior portion of abdominal segments IV–VII, the spines of the larval stage being marked on them by small tubercles; remaining segments with dorsal and subdorsal rows of small warts, distinctly orange-tinged. Spiracles pale orange. In the intersegmental area traces of the subdorsal and subspiracular lines of the larva may be found, but these are not distinguishable on the general surface of the pupa. Wing sheaths with the brown veining forming more or less dark patches centrally near the antennal sheath and at the apex, adjoining abdominal segments I–III; an apical double row of raised white dots, about 1 mm. apart. Antennal sheath purplish with a row of raised white dots extending the entire length. Width of truncate apex 2½ mm. Length from apex to cremaster abdominally 10 mm. Width of mesothorax 3½ mm. Breadth at apex of wing cases 4½ mm.

EXPLANATION OF PLATE I.

Fig. 1.—*Phyciodes batesi* Reak, ♀.
Fig. 2.— " " " ♂.
Fig. 3.— " " " ♀, underside.
Fig. 4.— " " " ♂, " "
Fig. 5.— " *tharos* Drury, ♂, " "
Fig. 6.— " " " ♂, " "
Fig. 7.— " " " ♀, " "
Fig. 8.—Pupa of *Phyciodes batesi*, dorsal view.
Fig. 9.— " " " " lateral view.
Fig. 10.— " " " " ventral view.

TWO NEW SPECIES OF PLATYCAMPUS— (HYMENOPTERA TENTHREDINIDÆ).*

BY ALEX. D. MACGILLIVRAY,
University of Illinois, Urbana, Ill.

The genus Platycampus contains four species, *americanus* Marlatt from New York and New Hampshire and three western species, *smithi* Rohwer and *albostigmus* Rohwer from Colorado and *juniperi* Rohwer from New Mexico. To these are now added another species from New Mexico and one from British Columbia. The following table, in which the species of Rohwer are placed from his descriptions, will serve for their discrimination:—

a. Head and thorax wholly or in great part reddish-yellow
  b. Clypeus broadly shallowly emarginate, almost truncate.
    c. Head wholly or for the most part reddish-yellow
      d. Frontal crest strongly notched at middle; median fovea shallow, walls sloping; ocellar basin with rounded walls; antennal segments enlarged at distal end, third segment longest; stigma broad, not strongly tapering to distal end; colour reddish-yellow with the following parts white: clypeus, labrum, mandibles,

*Contributions from the Entomological Laboratories of the University of Illinois, No. 63.
March, 1920

cheeks, and tegulæ in part; with the following parts black: first and second and part of third antennal segment above, eyes, ocelli, spot on lateral lobes, suture between mesonotum and mesoscutellum, metanotum, postscutellum, middle of basal plates, proximal part of metacoxæ, a spot above, and saw-guides; wings with veins pale brown, costa and stigma white.—Colorado.....*albostigmus* Rohwer.

dd. Frontal crest entire, not notched, large and prominent; median fovea broad and shallow; ocellar basin sharply limited, walls rounded; antennal segments enlarged at the distal end, the third and fourth segments subequal; stigma long, the caudal margin broadly convex; saw-guides retracted and concealed, distal end bluntly pointed; colour reddish-yellow with the sutures of the thorax in part and the central area of the mesosternum black.—Cloudcroft, New Mexico; H. L. Viereck, collector.....*vierecki*, n. sp.

cc. Head wholly black; median fovea shallow, traingular; ocellar basin almost wanting; antennæ with the third and fourth segments subequal; stigma broad, rounded on the caudal margin, broadest at proximal end; saw-guides broad, apex truncate, the lower margin oblique; colour reddish-yellow with the following parts black: the head, antennæ, spots on the lateral lobes of the mesonotum, the metanotum, the pectus, the legs, and saw-guides; labrum and four cephalic tibiæ and tarsi brownish.—New Mexico. —Bred from larvæ on Juniperus.....*juniperi* Rohwer.

bb. Clypeus deeply emarginate; stigma wholly or part yellowish hyaline; antennæ black above or wholly black.

c. Median fovea broad, comparatively deep, sides oblique; frontal crest strong, hardly notched; ocellar basin a rounded depression with rounded lateral walls, connecting with ocellar furrow; antennal segments three and four subequal; saw-guides pointed, the upper margin straight, the ventral margin slightly convex; colour reddish-yellow with the sutures of the thorax in part and the scutellum and the metathoracic pleuræ sometimes, black; the antennæ blackish or brown above; coloration extremely variable.—New Hampshire, New York.—Larva feeds upon poplar.....*americanus* Marlatt.

cc. Median fovea shallow, broad, walls sloping; frontal crest strong, slightly notched at middle; ocellar basin distinct, rather sharply pointed above; walls somewhat rounded; stigma large, broadest near the proximal end, tapering to the distal end; saw-guides broad, rounded on ventral margin, a brush of setæ at the distal end; colour reddish-yellow; clypeus, labrum, proximal portion of mandibles, posterior angles of pronotum and tegulæ somewhat pallid; antennæ above, small spot around ocelli, a small spot above each antenna, two spots on lateral lobes of mesonotum, sutures of caudal part of thorax, postscutellum, metanotum, middle of basal plates, proximal portion of posterior coxæ, caudal

portion of first and second terga, and proximal portion of saw-guides, black or brownish.—Colorado..... *smithi* Rohwer.

aa. Head and thorax, except pleuræ, glossy black; frontal crest moderately prominent, deeply interrupted by an extension of the elongate suboval median fovea; ocellar basin distinct with rounded walls extending around median ocellus; antennæ with third and fourth segments subequal; head and thorax finely setaceous; saw-guides straight above, pointed at distal end above, and ventral margin convex and oblique at distal end; colour reddish-yellow with head, including clypeus, labrum and antennæ, the pronotum except the lateral portion, the mesothorax and metathorax except the lateral aspects; the pectus, and the tips of the tarsi black; the proximal portion of the stigma and the longitudinal veins extending through the disc of the wing blackish; the male differs in having the antennæ reddish-yellow and the frontal crest obsolete and the sides of the median fovea continuous with the sides of the ocellar basin; the proximal end of the ventral side of the third antennal segment provided with a blunt, rounded projection.—Victoria, British Columbia, bred by W. Downes from larvæ on lombardy poplar.—Type deposited in National Collection of Insects, Ottawa, from which it was received..... *victoria*, n. sp.

NOTES ON COCCIDÆ VI. (HEMIPTERA).*

BY G. F. FERRIS,
Stanford University, Calif.

Genus Porococcus Ckll.

Coccidæ referable to the subfamily Dactylopiinæ (of the Fernald Catalogue) and belonging to the *Pseudococcus* group, that is, with at least the posterior pair of dorsal ostioles present. Adult female with the legs and antennæ present, the former without a tooth on the claw, the latter 6-7-segmented; without cerarii of the usual type but with the last three or four abdominal segments bearing at each lateral margin a chitinized area which may be continuous with a chitinized area extending across the dorsum of the segment and is beset with stout, conical spines; trilocular pores numerous and very conspicuous; anal ring with six long setæ, well developed and heavily chitinized, not borne at the inner end of an invagination.

Adult female enclosed within a test of hard, black secretion which in texture much resembles that of the genus *Tachardia*.

Type of the genus, *Porococcus tinctorius* Ckll

Notes.—In the Fernald Catalogue this genus is placed near *Ericoccus* but it is distinctly a pseudococcine form. At present the genus contains but the type species and another, *P. pergandeii* Ckll., both of which occur on mistletoe in Mexico.

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*Continued from Canadian Entomologist, Vol. LII, p. 32.

Porococcus tinctorius Ckll.

Fig. 12.

Habit.—Adult female entirely enclosed within a test of hard, black secretion which is roughly spherical in form.

Morphological characteristics.—Length (flattened on slide) 2.5 mm. In form the body (flattened on the slide) is almost circular except for the fact that the last four abdominal segments, together being much narrower than the remainder of the body, form a sort of tail (Fig. A). The terminal segment bears the rather large and heavily chitinized anal ring, which is flanked on each side by a large, chitinized area bearing two or three conical spines and a few

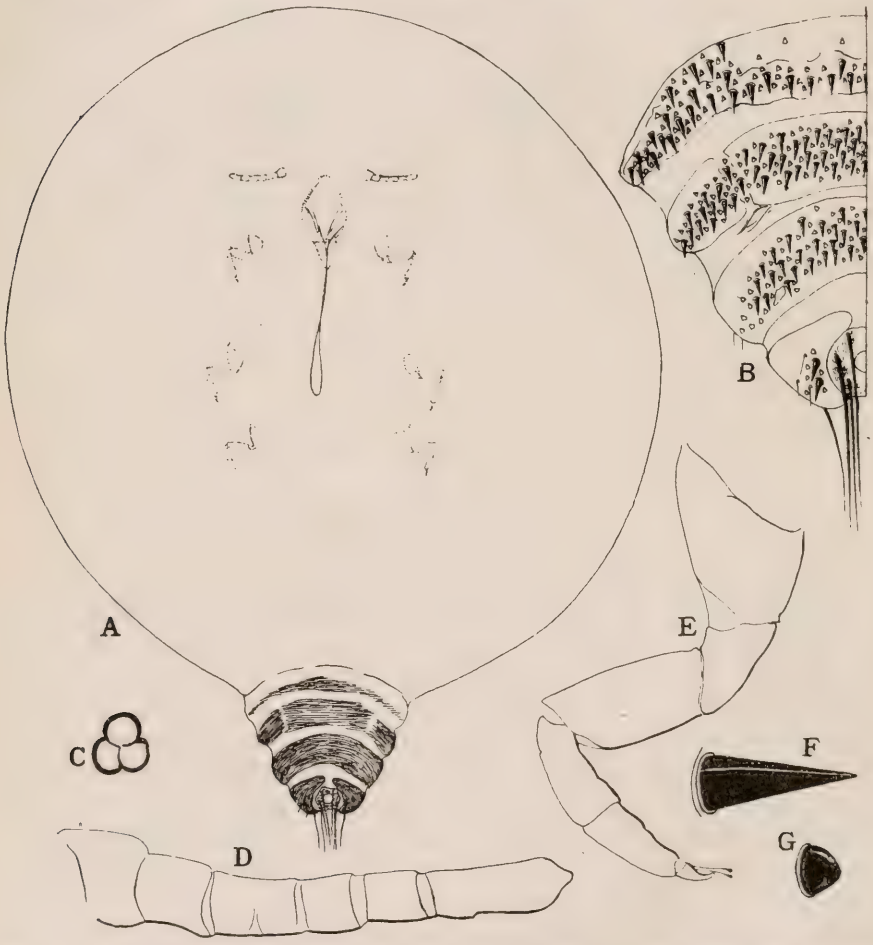

Fig. 12.—*Porococcus tinctorius* Ckll. A, general aspect of body; B, dorsal aspect of last four abdominal segments; C, trilocular pore; D, antenna; E, leg; F, type of spine occurring on dorsum of last four abdominal segments; G, type of spine on the dorsum anterior to the last four abdominal segments.

pores, these areas nearly meeting at the median line of the dorsum and extending slightly on to the ventral side. The next three segments each bear a transverse, heavily chitinized area beset with numerous conical spines of the type shown in Fig. F and pores (Fig. B). Over the remainder of the body the spines are rather few and are much smaller, short and tubercle like (Fig. G). Tri-

locular pores, of the type shown in Fig. C are very numerous and unusually large and conspicuous. The antennæ (Fig. D) are relatively quite small but are well developed and show six or seven segments. The legs (Fig. E) are likewise relatively quite small, and the coxæ of the posterior pair show many small pores.

The first stage larva likewise bears numerous large, trilocular pores and a few small, conical spines. The anal ring is large and cellular and bears six setæ. The anal lobes each bear a single seta which is about as long as those of the anal ring. There are no indications of cerarii.

Material examined.—Two slides received from Professor Cockerell and labeled merely as "types" of this species and a slide mount of a single individual received from Mr. E. E. Green and said to be from the type material of the species. It is from the last that the accompanying figures were made.

There has evidently been some mixing of material in connection with this species for another slide received from Professor Cockerell and likewise labeled as a "type" of this species represents some Lecaniine form.

Through the kindness of Professor Cockerell I have had the privilege of examining a slide labeled as a "type" of *P. pergandeii*. The two species are very similar but I am not prepared to say whether or not they are identical.

Genus Cissococcus Ckll.

Brain[1] has considered it necessary to erect a new subfamily, the *Cissococcinæ*, for this genus. As I have previously pointed out in this series of notes this genus is a Lecaniine form showing certain affinities with *Ceroplastes*. The statement that the anal plates are four in number is erroneous, the supposed outer pair being nothing more than the chinitized area upon which the anal plates are borne. The arrangement is strictly the same as that seen in *Ceroplastes*, and a comparison with the latter genus will dispel any thought of the necessity of a new subfamily for *Cissococcus*.

Genus Howardia Berlese and Leonardi.

1896. Berlese and Leonardi, Rev. Patologia Veg., 4: 347.
1896. Cockerell, Bull. Bot. Dept. Jamacia, 3: 256.
1903. Fernald, Cat. Coccidæ, 226.
1915. Paoli, Redia, 11: 255.

There appears to be some confusion concerning the type of this genus. Under the original description there were included three species, *Chionaspis biclavis* Comst., *C. citri* Comst. and a species there described as new under the name of *Howardia elegans*, this last being a synonym of *Diaspis zamiæ* Morgan. No type was designated. Cockerell (1896) in a paper which seems to have been omitted by the Fernald Catalogue, designates as type, *Chionaspis biclavis* Comst. This paper appears to have been overlooked by Paoli (1915) who states that *H. elegans* (= *zamiæ*) is the type of the genus and he names a new genus, *Megalodiaspis*, for *Chionaspis biclavis*.

It is evident that the type fixation made by Cockerell must stand, and that *Megalodiaspis* must be placed as a synonym of *Howardia*.

Genus Anoplaspis Leonardi.

1898. Leonardi, Rev. Patologia Veg., 6: 207.

[1]Brain, C. K. Coccidæ of South Africa II. In Bull. Ent. Res. 9: 109, (1918).

1900. Leonardi, Ibid., 8: 344.

1903. Fernald, Catalogue Coccidæ, 299.

This genus was named by Leonardi in 1898 and its type was definitely stated to be *Mytilaspis metrosideri* Maskell. Later (1900) Leonardi stated that he found *metrosideri* to be a species of *Aspidiotus* and he transferred the generic name *Anoplaspis* to the species earlier named by Cockerell as *Aspidiotus bambusarum*, designating this as the type. This procedure is followed in the Fernald Catalogue and *Anoplaspis* is placed as a synonym of *Odonaspis* in which the species *bambusarum* is included. The species *Mytilaspis metrosideri* Maskell is placed under *Lepidosaphes* in the catalogue and no reference is given under it to Leonardi's first paper.

It is obvious that the first type fixation must stand and that the status of the genus *Anoplaspis* depends upon that of *Mytilaspis metrosideri*, its type species.

A revision of the genera of Diaspinæ must soon come for the group is falling into confusion because of the many genera and subgenera that have been named usually upon characters of no particular significance. Many of these names, however, must be used, and it is desirable that such points as those discussed above be straightened out.

Synonymy of Some Species.

Targionia yuccarum Ckll.

1898. *Aspidiotus yuccarum* Ckll., Ann. Mag. Nat. Hist., (7), 2: 25.

1900. *Chrysomphalus (Melanaspis) tonilensis* Ckll., Ibid., (7), 10: 470.

1919. *Targionia covilleæ* (Ferris), Contrib. Knowl. Coccidæ Sw. U. S., Stanford Univ. Publ., 67–8.

Mr. Morrison has called my attention to the fact that my *Targionia covilleæ* is identical with *T. yuccarum* (Ckll.), and has sent me a specimen of the latter species. There is no doubt that the two are the same. Also, through the kindness of Professor Cockerell, I have been enabled to examine a slide of *Chrysomphalus tonilensis* Ckll. from the type material, and this too proves to be the same. The species is a true *Targionia* as I have pointed out in the description of my *T. covilleæ*.

Aspidiotus herculeanus Doane and Hadden.

1909. *Aspidiotus herculeanus* Doane and Hadden, Can. Ent., 41: 298.

1918. *Aspidiotus subsimilis* var. *anonæ* Houser, Ann. Ent. Soc. Am., 11 m.: 163; pl. 18, f. 1.

The figure given by Houser indicates clearly that his *A. subsimilis* var. *anonæ* is identical with *A. herculeanus*, and Mr. Morrison, to whose attention I have called this and who has examined specimens, agrees that this is the case. I have had the privilege of examining a "type" slide of *A. subsimilis* Ckll., and unless intergrading forms exist there is no reason for placing *herculeanus* as a "variety" of this species.

Pseudodiaspis yuccæ Ckll.

1896. *Aspidiotus yuccæ* Ckll., Psyche, 7; Suppl. 1, p. 20.

1898. *Aspidiotus yuccæ* var. *neomexicana* Ckll., Ann. Mag. Nat. Hist., (7), 2 m.: 25.

1899. *Xerophilaspis parkinsoniæ* Ckll., Ariz. Exper. Sta., Bull. 32 m.: 282.

1899. *Diaspis celtidis* Ckll., Can. Ent., 31 m.: 106.

1919. *Pseudodiaspis parkinsoniæ* (Ckll.), Ferris, Contrib. Knowl. Coccidæ Sw. U. S., Stanford Univ. Publ., 56; Fig. 30.

Through the kindness of Professor Cockerell I have been enabled to examine "type" slides of all the above species. There is not much room for question that they are the same. In the specimens of *yuccæ* the lobes are shorter than in the others, but otherwise there is no difference, and I suspect that, as not infrequently occurs, the lobes in these specimens are worn or broken off.

Lepidosaphes hawaiiensis Maskell.

1894. *Mytilaspis flava* var. *hawaiiensis* Mask., N. Z. Trans., 27: 47.

1914. *Lepidosaphes erythrinæ* Rutherford, Bull. Ent. Res., 5: 264.

1916. *Lepidosaphes moorsi* Doane and Ferris, Bull. Ent. Res., 6: 401; f. 3.

1919. *Howardia moorsi* (D. & F.), Brain, Bull. Ent. Res., 9: 220; pl. 13, f. 132.

Mr. E. R. Sasscer has called my attention to the fact that *L. moorsi* appears to be identical with Maskell's *L. flava* var. *hawaiiensis*, and after the examination of a photograph of the pygidium of the latter I am entirely disposed to agree. I have at hand some specimens from Ceylon which agree with the description of *L. erythrinæ*, and there is not much doubt that this too is the same. It is evidently a widely distributed tropical and subtropical species.

Brain has recently referred the species to *Howardia*, but it is most certainly not congeneric with *H. biclavis*. For that matter it is hardly a *Lepidosaphes* but it may well remain in the latter genus until revisional studies have been made. There is no evidence that it has anything to do with *L. flava*.

DESCRIPTIONS OF A FEW NEW DIPTERA.

BY NATHAN BANKS.
Museum of Comparative Zoology, Cambridge, Mass.

The types of the following new species are in the Museum of Comparative Zoology.

Euparyphus pretiosa, sp. nov.

Differs from *crotchi* as follows: Legs wholly yellow, the median black stripe from vertex mark to antennæ does not go below antennæ, the submedian pair of stripes on thorax extend a little beyond the suture, are broader posteriorly and slightly approximate there, the hind part of lateral stripe is longer, the upper pleural stripe is longer and has a forward extension, the spots on third and fourth abdominal segments are much larger and almost meet in the middle, venter wholly pale (mostly dark in *crotchi*). The scutellum is yellow, broad, and the spines are far apart as in *crotchi;* the discal cell is clearly outlined; eyes pubescent.

Length 7.5 mm.

Vancouver, one female.

E. septemmaculata Adams agrees with *E. crotchi.*

Nemotelus melanderi, sp. nov.

Black, polished, without pale marks, in some a faint lateral margin to thorax, the extreme tips of femora, bases of tibiæ and tarsi pale; halters pale,

the thorax with faint white pubescence. Facial projection extremely short, about as in Melander's figure of *N. bruesi*, but not blunt at tip, and the antennæ plainly at base of the projection; discal cell with upper side distinct.

In Melander's table it runs to *N. carbonarius*, which has a very much larger facial projection.

Length 3 mm.

From Chesapeake Beach, Ind., 9 July, also Bayville, N.Y., and Nahant, Mass., (Agassiz). Evidently a costal species.

Stenopogon (Scleropogon) uhleri, sp. nov.

Clothed with grayish pubescence and white hair and bristles; antennæ black, wings hyaline, abdomen obscure, tips of segments paler, legs dark, some reddish on front and middle femora. Wings with first and fourth posterior cells closed and petiolate; hypopleura with white hairs, sternopleura with short fine hair. Male ventral plate divided at tip and the lobes divergent; the intermediate appendages have the inner black hooks as in *S. similis*, but when seen from the side do not have a black process at the lower corner, seen in *S. similis*.

Length 2.3 mm.

From the hills west of Denver, 18 Aug., (P. R. Uhler). Differs from *S. similis* and *S. pumilus*, which are of the same general appearance, by having the lobes of the ventral plate longer and divergent.

Atomosia antennata, sp. nov.

Head black, thorax metallic bluish, abdomen metallic greenish, venter brown, legs with the femora pale reddish or yellowish, tibia dark brown, tarsi lighter brown, palpi pale, antennæ dark, second joint yellowish, wings nearly hyaline, pleura with two or three patches of silvery pubescence. Face clothed with whitish pubescence and white hair, thorax and abdomen with very short pale hair, legs with longer white hair. Ocellar tubercle with two bristles; first joint of antenna a little more than twice as long as the second, which is rather shorter than usual, third not twice as long as first and second together; end of discal cell curves out a little from the end of the fourth posterior cell.

Length 5 mm.

From Douglas, Arizona, August, (L. H. Snow). Distinct from all our other species by colour of second antennal joint, as well as by the metallic colour of thorax and abdomen.

Nicocles utahensis, n. sp.

♀ Structurally similar to *N. aemulator* Lw., the bristles on the scutellum and thorax as in that species. It is, however, black in colour with white hair and pile, instead of the brown hair and somewhat yellowish pile of *N. aemulator*. The dorsum of thorax beside the middle geminate dark stripe has also short lateral dark stripe in front; the legs are entirely black (without the red seen in *N. aemulator*); the abdomen is very similar to the female of that species, with pollinose white spots, but those on the fifth segment are triangular and smaller than in *N. æmulator*. The wings are marked on the same plan, but the marks follow the longitudinal veins, and there is no tendency to form dark clouds

across middle and tip as in the California species. In both wings the small cross vein is double, and situate at middle of discal cell (in *N. æmulator* nearer to tip of cell.

From Eureka, Utah, 31 May, (Tom Spalding), from Mr. Hagan.

Laphria varipes, n. sp.

Closely similar to *L. ruficauda* Will.; it differs in the antennæ being black, and the legs have the apical fourth of the femora and the tarsi wholly black; the abdomen is dull black (instead of shining blue black), the last three segments red as in *L. ruficauda;* the humeri and scutellum are also reddish; the wings as in *L. ruficauda.*

Length 2.3 mm.

From Cuba (Poey).

Asilus persimilis, n. sp.

Similar to *A. truquii* in the male genitalia, which have a long, slender tooth on the upper forceps, which bends inward and downward; the main part of the forceps, however, bends downward, instead of upward as in *A. truquii.* It differs from that species in having a large facial gibbosity that almost reaches to the antennæ. The mystax is black above and below, with yellowish hair on the middle; the wings are faintly reddish from near the middle, especially near costa. The body is black, with black hair and bristles; the abdomen above rather more grayish, and the hind border of each segment in certain lights paler gray; the genitalia black, black haired, and the lower forceps rather heavily black bristled. Legs black, apical part of all femora and almost basal half of all the tibiæ reddish; tarsi black.

Length 16 mm.

From California (Loew coll.).

Asilus sackeni, n. sp.

In size and general appearance similar to *A. mesæ* Tucker; about 8 to 10 mm. long. Differs in the longer appendages to the male, and in the black hair in the mystax.

Black; mystax largely black, lower part white; the facial gibbosity not higher, but longer than in *A. mesæ;* occipital orbital bristles black; pleuræ more black, with faint gray pollen; thorax and the scutellum with black bristles. Abdomen above brown (not gray), with gray borders; genitalia reddish, the superior forceps plainly more slender than in *A. mesæ.* Legs black, the tibiæ more or less brown, especially within, bristles of legs all black. The antennæ has the arista more differentiated than in *A. mesæ,* but not as strongly separated as in most species.

From Webber Lake, California, 22 July (O. Sacken), and also Oregon (O. Sacken).

The much longer, superior forceps and largely black mystax and darker colour generally will separate it from *A. mesæ.*

NOTES ON THE WINTER COLEOPTERA OF WESTERN AND SOUTHERN FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY,
Indianapolis, Ind.

(Continued from p. 46).

Ptinus tuberculatus, sp. nov.

Oblong-oval. Head and thorax dark chestnut-brown; elytra dark reddish-brown; antennæ and legs paler brown, densely clothed with prostrate yellowish hairs; under surface reddish-brown, sparsely pubescent with yellowish hairs. Antennæ reaching middle of elytra, second joint one-half the length of fourth; fifth to eleventh subequal, each slightly longer than fourth. Head finely granulate-punctate. Thorax subcylindrical, but slightly wider than head, densely and rather coarsely granulate-punctate and bearing four large conical tubercles arranged in a median cross-row, two above and one each side, each of these bearing a tuft of short, erect yellowish hairs. Elytra oblong, rather strongly convex or ventricose, their striæ feebly impressed, each composed of a row of coarse, close-set punctures, which are much wider than the intervals, each puncture bearing a long inclined yellowish hair. First joint of hind tarsi slightly longer than the next two united. Abdomen very finely and sparsely punctate. Length 3.2 mm.

A single specimen, probably a female, was taken while beating along a blazed roadway in a dense hammock at Cape Sable, Feb. 23. It is different from any species described by Fall, and is unknown to him. The head and thorax are distinctly darker than elytra, and the tuberculate thorax reminds one of the spiked collars often worn by an aristocratic Boston bull terrier.

Heteracthes sablensis, sp. nov.

Elongate, slender, subcylindrical. Head, thorax, under surface and all the femora and tibiæ dark chestnut-brown; antennæ, elytra and tarsi reddish-brown, the elytra each with a large, elongate-oval, yellow spot at basal third and the apical fifth wholly yellow. Antennæ, as usual with males of the genus, with joints 1–6 much thicker than the others, fourth, two-thirds the length of either third or fifth, the minute second joint obconical. Thorax cylindrical, twice as long as broad, feebly constricted near base, its disk with a low median tubercle, surface minutely granulate-rugose and pubescent with very fine, appressed hairs. Elytra three times as long as thorax, one-third wider at base, their tips subtruncate, the outer apical angle produced as a short spine; surface with scattered small tubercles, thickly and very finely punctate, minutely pubescent. Under surface very finely punctate and pubescent. Length 8.5 mm.

Described from one male swept from low herbs just back of the beach at Cape Sable, Feb. 21. Very distinct from our other species in colour and in the truncate, feebly spined tips of elytra.

Euderces reichei Lec. A half dozen specimens of this small Cerambycid were beaten March 21 from the flowers of a dogwood in Skinner's hammock near Dunedin. The first record for Florida, it being known heretofore only from Indiana, Illinois and Texas.

Liopus floridanus Ham. Two specimens of this small, dull-coloured Lamiinid were swept from ferns in a dense hammock near Dunedin, March 10–March 24. Described[11] from Biscayne Bay and not recorded elsewhere.

Lepturges signatus Lec. A single specimen taken at light at Dunedin, June 15. Schwarz records it from Enterprise as "rare."

Spalacopsis filum Chev. This was a common species on dead twigs in the hammocks at Cape Sable and Key West. When stretched out on a twig with their long antennæ at full length in front of them, their gray colour is so similar to that of the bark that they are almost invisible. Although three or four species of this genus have been described or listed from southern Florida, it is very doubtful if more than the one above named really exists in that region.

Exema neglecta, sp. nov.

Oblong, robust. Black, opaque; antennæ, palpi, front and middle legs in great part, and some spots on head, dull clay yellow; face and front half of thorax of male wholly of the same hue. Head finely, not closely ocellate-punctate. Thorax finely and irregularly punctate, the middle of disk strongly elevated, tuberculate and with a shallow median sulcus, the sides and posterior declivity of the elevation strigose-punctate. Tegmina oblong, each with a subsutural row of three or four blunt tubercles and several other scattered ones, the intervals between them coarsely, more or less confluently punctate. Pygidium with a narrow, entire median carina between two shorter, broader ones, the intervals coarsely punctate. Hind femora and under surface coarsely punctate. Length male 2.7; female 3 mm.

Common throughout Florida on huckleberry and other low shrubs throughout the winter months. This is the species known in most cabinets as *Exema conspersa* Mann., and has been distributed by me under that name On taking the true *conspersa*, which is very scarce in Florida, I sent specimens of both to the U.S. National Museum, and H. S. Barber replied that the larger one above described was in the museum collection under the name *conspersa* var., some specimens also having been labeled *E. dispar* Lec. On a recent visit to Cambridge, I found that the smaller form was the one there recognized as *E. conspersa*, and as the larger and more common one appears to have no name, I have given it that of *neglecta*.

Exema conspersa Mannerheim. This is a much smaller (1.8–2 mm.), more subquadrate species than *neglecta* and usually has both thorax and elytra distinctly maculate with brownish-yellow. The thorax is without strigæ, its punctures more numerous, much deeper. The elytra are more rugose with crests of tubercles longer, more narrow, and the punctures much smaller. A single specimen is in the National Museum from Enterprise, Fla. About Dunedin I have taken it on several occasions by sweeping weeds about the margins of low, moist, cultivated tracts. It ranges from Florida to California and Mexico.

As pointed out to me by Mr. Barber (Ms.) my *Chlamys nodulosa*[12] is probably a synonym of *Exema gibber* Fabr. It was originally described from

11. Trans. Amer. Ent. Soc., XXIII, 1896, 125.
12. Can. Ent., XLV, 1913, 22.

Charleston, S. Car., and occurs in both bronzed and opaque black forms. The description of Fabricius mentions the black form only.

Metachroma terminale Horn. Frequent at both Cape Sable and Key West on the foliage of shrubs in hammocks. The elytra vary much in colour, being sometimes wholly dull yellow, again uniform pitchy black without the terminal pale spot on which the specific name was based.

Metachroma testacea, sp. nov.

Form short, robust. Head and thorax reddish-brown, remainder of body a uniform testaceous. Head coarsely, shallowly and irregularly punctate. Thorax semi-elliptical, much wider and with sides less declivent than in *M. pellucidum;* sides and hind angles broadly rounded, disk finely, rather closely, evenly and sharply punctate. Elytra one-third longer than wide; striæ near suture distinctly impressed, those on sides scarcely so, all with distinct rows of round punctures separated by two-thirds their own diameter. Abdomen rather finely and very sparsely punctate. Length 2.3–2.5 mm.

A small species of the form and size of *M. pellucidum* Crotch, but much duller in colour, with different form of thorax and with elytral striæ all entire and punctate throughout their length. It was taken in some numbers by beating and sweeping at Key West, March 1–3. Specimens were submitted to Mr. Fall, who states that he has it unnamed in his collection and considers it an undescribed form.

Trirhabda virgata Lec. One specimen taken at light at Dunedin, July 1, was sent to me by my son. No definite Florida record can be found. Horn states that it "Occurs on the Atlantic coast from Massachusetts to Florida, from which point to Texas it is replaced by *brevicollis.*" It is frequent throughout Indiana.

Galerucella bivittata, sp. nov.

Elongate-oblong. Dull clay yellow; antennæ and occiput entirely deep black; labrum, mesosterna, sides of abdomen and tarsi piceous black; thorax with a median stripe and a spot each side black; elytra each with a broad submarginal and a narrow subsutural stripe, the two broadly united at tip, deep black. Thorax transversely elliptical, about one-half wider than long, angles all rounded, disk concave each side of the median line, very finely and sparsely punctate, each puncture bearing a very short, fine, appressed hair. Elytra elongate-oval, margins not explanate, disk densely and coarsely punctate, each puncture bearing a silken yellowish semi-prostrate hair; middle coxæ contiguous. Under surface minutely punctate, very finely pubescent. Length 4.5 mm.

Two specimens swept from huckleberry blossoms near Dunedin, March 21. The wholly black antennæ and occiput and bivittate elytra distinguish it from all other described species.

Longitarsus subcylindricus, sp. nov.

Elongate-oval or subcylindrical. Dull reddish-brown; basal half of antennæ, under surface and legs paler reddish-brown; apical half of antennæ fuscous. Head smooth, occiput strongly convex. Second, third and fourth joints of antennæ subequal in length, two-thirds the length of fifth. Thorax subcylindrical, scarcely longer than wide, disk convex, sides strongly declivent,

their margins feebly curved, surface finely and very shallowly punctate. Elytra conjointly elongate-oval, widest at middle, three times as long as wide, not wider at base than thorax, humeri and umbones wholly absent, disk with fine shallow substriate, close-set punctures. Abdomen smooth. Length 1.8 mm.

Very distinct in its elongate subcylindrical form, being widest at middle of elytra and tapering gradually but very feebly both ways. The surface is not alutaceous but appears subopaque, due to the numerous shallow punctures. It is probably apterous. Known from a single specimen taken by beating in Skinner's Hammock near Dunedin, March 27. Not in either the Leconte or Horn collections, and unknown to Fall.

Coptocycla repudiata Suffr. Twenty or more specimens of this tortoise beetle were taken at Cape Sable from among the bases of the tufts of a coarse grass growing on the open prairie. It was described from Cuba and is recorded by Barber[13] from Haw Creek, Crescent City and Cocoanut Grove, Fla.

Metriona ormondensis, sp. nov.

Broadly ovate or subcylindrical. Above dull yellow; elytra with a broad, purplish-red stripe extending obliquely from humerus to middle of lateral declivity of each strongly convex elytral disk, thence curving outward to margin near apical fourth; thorax and broadly flattened crescentic middle third of each elytral margin translucent yellow; eyes and under surface deep black; legs and joints 1–8 of antennæ pale yellow; joints 9–11 of antennæ fuscous. Thorax transversely elliptical, nearly twice as wide as long, its front margin very broadly curved, front angles narrowly rounded, surface reticulate and with a few scattered punctures near middle and at base. Elytra strongly elevated at middle with sides of elevation almost perpendicular; margins strongly explanate; disk with rows of round, shallow punctures, separated by about their own diameters, those on basal third and near humeri somewhat confused. Abdominal segments finely and sparsely punctate. Length 6 mm.; breadth 5 mm.

Described from two specimens taken from wild morning-glory at Ormond, Fla., April 13, 1913. Much larger than *M. purpurata* (Boh.), with flattened margins of elytra much wider, thorax wider and proportionally shorter and colour very distinctive. It is probably the same as the specimen referred to by Barber (loc. cit., p. 125) as being in the Schæffer collection from Florida. Barber considered that to be only a geographic race of *purpurata*.

Chelymorpha geniculata Boh. This large Chrysomelid was common and mating along the beach at Long Key, Feb. 27 on the foliage of the creeping goat's-foot morning-glory, *Ipomœa pes-caprœ* Sweet. It was taken on the same vine at Cape Sable, Key West and Dunedin, and I believe that to be its true, perhaps only, food plant in Florida. In my opinion this species should be placed as distinct from our northern *C. cassidea* Fabr. (*argus* Herbst.). In addition to the very different hue and much smaller black spots it is always narrower and more oblong in form.

Branchus floridanus Lec. A single specimen of this large, oval, gray, scaly Tenebrionid was found lying on its back in a roadway, but alive and kicking, at Key West. It was described[14] from Florida without definite locality and Schwarz lists it as "On Atlantic seashore, very rare."

13. Proc. Entom. Soc. Wash., XVIII, 1916, 123.
14. Smiths. Misc. Coll. No. 167, 1866, 111.

Polypleurus geminatus Sol. This is also apparently a scarce species. It has not been recorded from Florida. One specimen was taken near Lakeland, Feb. 15, beneath a large pine chip, and another at Dunedin, Dec. 25,by beating Spanish moss. Horn in his Revision of the family says that it occurs in the "Southeastern United States." The closely allied *P. perforatus* Germ., is listed by Schwarz from Enterprise as "very rare." The third and only other known species, *P. nitidus* Lec., is common beneath bark and logs about Dunedin and elsewhere in southern Florida throughout the winter.

Blapstinus alutaceus Casey. Three specimens of this scarce species were taken, one at Cape Sable, by beating dead branches, the others at Key West by sifting dead leaves. It was previously known only from Key West and Buck Key, Fla., and Texas. First described[15] by Leconte as *B. opacus*, which name was preoccupied.

Acanthinus trifasciatus Fabr. A single specimen of this West Indian species was taken from beneath a chunk on the beach at Cape Sable. It is also known from Key West.

Pomphopœa femoralis Lec. Two specimens of this large and brilliant Meloid have been in my collection unnamed since January, 1913, when they were taken at light at Dunedin. I supposed them to be some introduced tropical form which I could not place by the literature available. They were finally named for me by A. J. Mutchler of the American Museum of Natural History. Leconte described[16] the species from Louisiana, as *Lytta femoralis*, but it was afterwards erroneously placed as a synonym of *P. polita* Say by Horn.[17] The head and thorax are a shining bronze, while the elytra are of a brilliant coppery hue.

DIVISION OF FOREIGN INSECT PESTS SUPPRESSION.

In an endeavour to prevent the further spread of the apple sucker (*Psyllia mali* Schmid) by artificial means, a quarantine has been placed on the infested district in the vicinity of Wolfville, N.S. No apple stock, including seedlings, scions, buds or grafts may be removed from the quarantined area unless it is accompanied by a certificate of inspection.

The Brown Tail Moth work in New Brunswick was closed down in the middle of January. No nests have been found during the past two years. Only four men were employed this season, and the greater portion of the territory was scouted with the aid of a car. In Nova Scotia 267 Brown Tail nests were collected up to January 31st; this is a considerable reduction as compared with previous years. The brown tail is still continuing to breed in this Province, and local infestations are uncovered from time to time. The majority of scouts were discharged on January 31st.

15. Proc. Amer. Phil. Soc., XVII, 1878, 420.
16. Proc. Acad. Nat. Sci. Phil., VI, 1853, 336.
17. Proc. Amer. Phil. Soc., XIII, 1873, 116.

Mailed March 31st, 1920

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POPULAR AND PRACTICAL ENTOMOLOGY.

FAMILIAR HAUNTS.

BY FRANCIS J. A. MORRIS,
Peterborough, Ont.

Finding myself in Port Hope on the last day of June, 1918, I took occasion and my hobby by the forelock, and, in the company of my fellow-collector of old days, headed north for some woods just west of our favorite "Rocky Mountains." Here lies as pretty a tract as can be found in all Northumberland, with extensive bush to west and north and embracing roughly a square mile of ground. It forms a kind of table land of middle elevation between the Port Hope plains and the long wooded ridge that stands out against the skyline as you look north from the campus of Trinity College School.

Deserting our usual route for a somewhat more westerly course, we held up the Bewdley gravel-road past the first line north of Dale; here a rough road, closed off by a gate, runs east to a gravel pit. Just beyond this we turned north to examine a grove of mixed hardwood and pine where the axe had been busy. In spite of its being bright and hot, we could find nothing at work about the cord wood and stumps, nor even about a few recently felled maples lying crushed and shattered as saw or axe had left them.

It was hot work and dry, stumbling about the clearing over rough, hard-baked ground, and even my hobby—old war-horse that it was—showed signs of flagging. My companion dismounted altogether and soon found a ready-made cozy corner in the grass beneath a shady evergreen. Just before giving up the search myself, and already at the point of indifference, I happened to spy a trunk of white pine lying in the very centre of the clearing, where the sun poured down relentless rays.

As I approached it I saw a small, dark longicorn settle on the butt; this proved to be *Acmaeops proteus*, a beetle sufficiently uncommon in our neighborhood to warrant capture. Then while skirting the trunk, I noticed near the middle and on the upper side, clinging to the rough bark, a blackish longicorn with yellow marks on the elytra; at first glance I took it for *Clytanthus ruricola* and wondered what it was doing on pine, for I have never captured this insect except on foliage or in blossoms, where it is a voracious pollen-feeder. A second look showed me at once that the beetle was new to me; it was much shorter than *C. ruricola* and had a peculiarly truncate appearance. Moreover, the marks and lines of yellow pubescence on the wing-covers formed a different pattern from that of *Clytanthus*, being unlike both in shape and in disposition. Both insects are nearly black, "piceous" rather than jet; the antennæ in both are fairly short, somewhat darker in the stranger, whose thorax, also, is shorter and less elevated; the forward margin of the thorax in both is fringed with

yellow, but in the stranger the hind margin is also yellow; both have a yellow scutellum and a small patch of yellow at the base of each wing-cover; but the familiar long "L"-shaped mark of yellow behind this in *Clytanthus ruricola* is replaced in the stranger by a simple diagonal line slightly curved, and behind this is a transverse band of yellow continued across the sutural line over both elytra. The thighs of both insects are clavate, but in *C. ruricola*, only, are the hind thighs and tibiæ elongate; in the stranger they are even shorter than in *Xylotrechus* and more strongly clavate. The insect has been identified as *Clytus marginicollis* and is, I believe, a great rarity in Ontario; at any rate, it is a new species and a new genus in my collection, filling an important gap in the group of *Clytini.*

It was quite enough for me that I had been collecting Longicorns for 15 years and had never seen this insect before. There lay my friend, inert as the weariest of mere wayfarers without an object could possibly be on a sizzling hot day; but my capture filled me at once brimful of activity and fervour. I spent a good half hour peering about that pine trunk and its limbs in the hope of another capture, and even when we decided to move on, I was still straining at the leash, eager to beat the next cover for game.

Just west of Hume's old home-farm is a sloping hillside covered with small trees and intersected by streams of cress-mantled spring water. At one of these I stooped to drink, for a long draught is worth far more to the pedestrian on a hot day than solid food of any kind. While thus refreshing myself I observed on the further bank a recent windfall of basswood; "windfall," I call it, but it might almost have been called a "water-fall;" for its roots had been undermined by a freshet, and a sudden flaw of wind taking it by surprise had overturned it. It was while struggling up the further bank, with one eye glued on the basswood, that I caught sight of a specimen of *Neoclytus erythrocephalus* running along a limb on the off-side of the fallen tree. As soon as I got to the top of the bank I hurried round the head of the tree to where I had seen the insect. There it was again! but unfortunately hurrying down towards the axil of a large limb impossible of approach owing to the thicket of grapevine into whose midst the tree had crashed. However, I kept the insect in view, and presently to my relief it faced about and came up towards the smaller branches at the top of the bank. And here after a little anxious stalking, I made my capture. Next moment I saw the dead image of it, very much alive, hurrying along the limb again; had it escaped from the cyanide jar? No, there it was safe in the glass bottle. Again I stalked my quarry, and again I made my capture; and presently, behold a third, running along the trunk. Where the insects came from I could not discover, but it seemed certain that they arrived by aeroplane and became visible only on alighting. Some time after, I spied a fourth, but it managed to elude the eager clutch of my fingers, as it had the jaws of my forceps and the yawning gape of my net; no sooner did it take to flight than it vanished into thin air.

In its descent the tree had broken some shoots of sumach at the top of the bank;close to these, but nearly under the basswood and in neutral territory on the ground, I captured a beautifully marked grey-brown Lamiinid which proved to be *Lepturges symmetricus;* some days later, my friend took a second specimen

on the basswood, so perhaps the latter has the better claim to have bred out this insect; on the broken sumach, I captured a specimen of *Lepturges querci*, and on a bruised branch of the basswood, just before leaving, I took *Eupogonius subarmatus* and *Leptostylus macula;* this last I have taken 3 times on basswood and rather more often on sumach; it is very fond of attaching itself to a branch —usually of small girth—that has been bruised or broken, and there I presume it oviposits. A few years ago my friend captured 8 or 10 of these insects and 3 or 4of *Goes oculatus* in a few sumachs on the south edge of what we know locally as the North Wood. The insects were nearly all on branches partly killed; and the whole colony of sumachs where they were taken is now dead, I believe almost entirely as the result of Lamiinid larvæ; large numbers of *Hyperplatys aspersus* and *Liopus alpha* riddling the small branches, while *Leptostylus* and *Goes* tunnel the thicker stems. The life of a sumach thicket, all observers will readily admit, is remarkably short, shorter than that of an elder thicket, and in nearly all cases the destruction is caused by insect borers. These light, brittle woods with a pithy core being, it would seem, peculiarly prone. In the particular section I am speaking of, equally deadly has been the work of the weevil, *Cryptorhynchus lapathi*, among the willows bordering the small streams.

We were now at the edge of our chosen trysting place, one of the prettiest spots in all these northward tramps of ours. The time was ripe for lunch and a rest on soft mossy turf, within sight and sound of birch and pine and running water; a land of sunny upland pastures, of sumach thickets and shaded streams, of rich, if somewhat swampy hardwoods. To the north ran a long windbreak of pines that climbed suddenly up to the skyline over the shoulder of a great bare hill, outpost of a whole host of others more distant, from a few of which one sometimes caught a far-off glimpse both of Rice Lake and of Lake Ontario at a single halt. It was among the branches of the last pine in sight on the slope that I had got my first close view of a Mourning Dove one hot September afternoon. On the edge of that sloping wood to the west, with its intersecting runnels of cold spring water, we seldom failed to mark, in May or early June, the gorgeous plumage of the Scarlet Tanager and hear its pleasing notes; under its pines abound morels and the Gyromitra or Curly Cap, a rich mahogany-brown cousin of the Morel; once or twice in its sequestered dells we had been held spell-bound by the exquisite grace of the Yellow Ladies' Slipper, and once at least by the deathly still, pale beauty, appalling in its tranquillity, of the Destroying Angel (*Amanita phalloides*). Just north of us runs eastward a path leading to the Bethel road; and here on its south margin, beyond a spongy bit of marsh where spears of the Adder's Tongue fern thrust up, if you look about you carefully, you will make the same happy discovery that I made many years ago, the double surprise of a whole row of blue beech, that somewhat uncommon kinsman of the Ironwood or Hop-hornbeam, and beyond them, hidden from the path by some cedars, a flourishing colony of the Hay-scented Fern (*Dicksonia pilosiuscula*) with its beautiful spreading fountain of finely cut green fronds; the only station I know for this species within 10 miles of Port Hope. A few yards south of where we were lunching, under a fringe of evergreen, while gathering morels one day in May, I flushed a partridge from its nest of 13 eggs. The whole place teemed with happy memories! As the

eye brooded over the scene, the spirits of a thousand vanished hours started from every nook and corner of the land.

After lunch we moved south through the narrow strip of woodland. The first section of this was mixed wood, and many trees were lying about in the unsightly confusion known as a "slash;" some of them had been felled two or three years before, others had fallen soon after, victims of the first gale that smote their unprotected flanks. It was hot work and slippery making one's way from point to point, and only a succession of lucky finds kept one going at all.

My first strike was where a butternut and a maple had fallen together; on a limb and some boughs of the former I took 3 or 4 more specimens of *Neoclytus erythrocephalus* racing madly along in the sunshine; and on the under side of the maple trunk,—it was a lean-to—I captured one specimen of *Urographis fasciatus* and one of *Goes oculatus;* on a near-by elm I took several *Physocnemum brevilineum* and 2 specimens of *Saperda tridentata*, and finally on a basswood 2 or 3 seasons dead, a specimen of *Saperda vestita* and 3 of *Hoplosia nubila*, the latter evidently just emerged from a dead and broken bit of limb half way up the trunk.

Further south the strip of woodland had been almost entirely pine with an occasional oak, not heavily wooded, but with many open glades made beautiful by beds of bracken interspersed with orange lilies; it was here that I had first found in any abundance, among blossoms of the large wild geranium, the pretty little longhorn—pale yellow, decorated with spots of black—*Pachyta monticola*. Now, hardly a tree was left standing, and the whole space was invaded by a wilderness of tall, rank grass and weeds; here and there, half buried in the vegetation, lay heaps of decaying pine brush, and from some of the larger branches, carefully picked up and scanned, were taken 6 or 8 specimens of *Leptostylus sexguttatus*. Finally as we reached the higher ground at the south end of the plateau, where fewer trees had been felled, I captured a specimen of *Leptura zebra* just climbing up through the sheaf of leafy shoots about an oak stump. Two or three years before when first some of the oak and other hardwood here had been felled, I had taken early in July quite a number of good things by laying chips of freshly prised bark on the sappy stumps, my captures including the handsome *Calloides nobilis*, *Arhopalus fulminans*, *Centrodera decolorata*, and a small species of the Oak-pruner (*Elaphidion*). But now, though empty tunnels and fresh borings gave ample evidence of insect life in the dead wood, there was nothing visible on stump or trunk except this solitary specimen of *Leptura zebra*, an insect I have occasionally captured pollen-feeding in the clusters of New Jersey Tea as well as on oak stumps.

And here under the pines near the edge of the most southerly slope one gladly sprawled for a few minutes' rest, looking out across the plains to Lake Ontario and Port Hope, and ruminating pleasantly over the past. Then up for a four-mile stretch by side-road, lane and field, fragrant of wild grape and sweet briar, and so home at last, dog-tired, hungry as hunters, and every bit as happy.

TWO NEW SPECIES OF APHIDIDÆ FROM JAPAN.

BY RYOICHI TAKAHASHI,
Forest Experiment Station, Meguro, Tokio, Japan.

Stomaphis pini, n. sp.

Winged viviparous female.

Head, antennæ, eyes, thorax, legs, cornicles and cauda black. Abdomen nearly pale brown, above blackish, darkest at the part between the cornicles, and with a dark brown spot on the under side of each segment. Wings somewhat dusky, stigma and veins black, veins shadowed. Body long and rather narrow, nearly parallel-sided, and with many fine hairs. Head very short, compound eyes rather small, supplementary eyes visible. Antennæ somewhat slender, with many hairs, the first joint longer and broader than the second. The relative lengths of the 3rd and the following joints are as follows:

III 74, IV 30, V 27, VI 38.

The third joint has about fifteen very large sensoria on the entire length, the fourth about 4 and the fifth only the usual one.

Wings slender, stigma large, the third oblique, twice forked, stigmatic vein extending to the apex of the wing, the second oblique of the hind wing very long hooklets five in number. The ninth abdominal segment with a small tubercle on the side. Cornicles very short. Cauda short, with many hairs. Legs

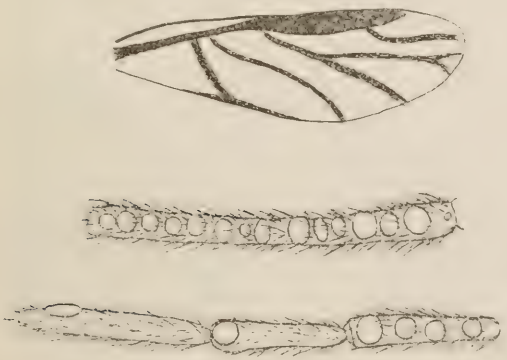

Fig. 13.—*Stomaphis pini,* n.sp., winged viviparous female; antenna (the 3rd to 6th joints) and fore wings.

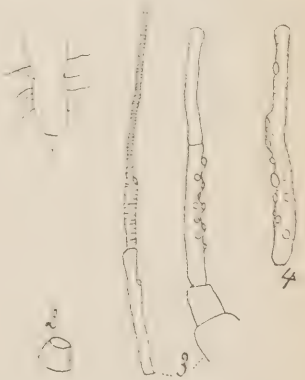

Fig. 14.—*Brachycolus gramini,* n.sp., winged viviparous female. 1. Cauda. 2. Cornicle. 3. Antenna. 4. The 3rd antennal joint of a female.

slender and long, hind legs much longer. Length of body 5.5 mm. Antennæ 2.3 mm. Rostrum 11.0 mm. Hind leg 5.4 mm. Fore-wing 5.5 mm. Hind wing 3.5 mm. Width of fore-wing 1.5 mm.

Host.—*Pinus densiflora.*

Type locality.—Tokio, Japan.

Many winged viviparous females which are probably sexuparæ, are found in November.

Brachycolus gramini, n. sp.

Wingless viviparous female.

Body black, somewhat greenish, densely covered with a white powder. Eyes, distal half of antennæ, cornicles, cauda, femora except distal half of the

fore femur and tarsi black. The third and fourth antennal joints and the basal portion of the fifth yellowish green. Distal half of the fore femur brownish, tibiæ yellowish brown.

Body rather oval, not elongated, without hairs. Antennæ much shorter than the body, without hairs. The relative lengths of the third and subsequent joints are as follows: III 22, IV 17, V 22, VI 50 (15+35). Rostrum reaching the middle coxæ. Cornicles very small, broader than long. Cauda large, rounded at the apex. Legs short.

Length of body 1.7 mm. Antenna 0.8 mm.

Winged viviparous female.

Nearly similar to the wingless female in colour. Wings hyaline, veins black.

Antennæ nearly as long as the body, the relative length of the distal four joints is as follows: III 28, IV 23, V 25, VI 50 (15×35). The third joint with about twelve large sensoria, the fourth joint wanting sensoria usually. In some individuals the antennæ are only 5-jointed. Cornicles broader than long, broadest at the base, cauda large, the apex rounded, with some long, fine hairs. Legs slender. The third oblique vein twice forked, hooklets two.

Length of body 1.1 mm. Fore-wing 2.2 mm. Antenna 1.0 mm.

Host.—A plant belonging to the Gramineæ.

Type locality.—Tokio, Japan.

This species is very common from August onwards throughout the summer, and during this period many winged females appear.

TWO UNDESCRIBED PEDICIINE CRANE-FLIES FROM THE UNITED STATES (TIPULIDÆ, DIPTERA).

BY CHARLES P. ALEXANDER.
Urbana, Ill.

The two new species herein described were included in material sent for determination. The new *Dicranota* found by Mr. Lindsey is of especial interest. The *Rhaphidolabis* shows the greatest resemblance to *R. tenuipes* in its general features, but the structure of the hypopygium shows it to be a very distinct species.

Dicranota iowa, sp. n.

Size large (wing ♀ over 9 mm.); general coloration light grey, the mesonotal praescutum with four dark brown stripes; wings brownish grey, the stigma and a seam along the anterior portion of the cord dark brown; Cell M^1 lacking.

Female.—Length 8–8.3 mm.; wing 9.5–10 mm.

Rostrum and palpi dark brown. Antennæ dark brown throughout, with thirteen segments; in the female sex, the flagellar segments are short-cylindrical, closely approximated. Head with the front and a narrow margin surrounding the eyes light yellowish grey; vertex with the disk rich brown, becoming paler on the occiput.

Mesonotal praescutum light yellowish grey with four dark brown stripes, the intermediate pair separated by a capillary line of the ground colour; scutum grey, the lobes dark brown; scutellum and postnotum grey. Pleura grey. Halteres short, the stem yellow, brightest basally, the knobs brown. Legs with

the coxæ light grey, the tips more yellowish; trochanters brownish yellow; femora dark brown, paler basally; tibiæ and tarsi dark brown. Wings with a brownish grey tinge; stigma dark brown, completely filling the space between *r* and the deflection of R^2 and occupying the outer end of cell Sc^1; a strong brownish tinge at the origin of *Rs* and along the deflection of R^{4+5} and *r-m;* less distinct seams along *Cu* and the other veins and cross-veins; veins dark brown. Venation: Sc^1 ending just beyond *r; Rs* long for a member of this genus, strongly angulated and sometimes spurred near origin, longer than that section of R^{2+3} between *r* and the deflection of R^2; R^{2+3+4} variable in length, unusually short in the type; *r* on R^{2+3} a little more than its length beyond the fork; R^2 meeting R^1 a short distance from the tip of the latter; cell M^1 lacking; basal deflection of Cu^1 approximately equal to or shorter than R^{2+3+4}.

Abdomen dark brown, the extreme lateral margins of the segments paler. Ovipositor horn-coloured, the valves strongly upcurved.

Habitat.—Iowa.

Holotype.—♀, Sioux City, April 17, 1916, (A. W. Lindsey).

Paratopotype.—♀.

Type in the collection of the Illinois State Natural History Survey.

The specimens of this interesting crane-fly were given to Mr. Malloch by the collector to whom we are indebted for this material. In its size and general appearance, *Dicranota iowa* resembles *D. argentea* Doane (Western North America) but is readily told by the absence of cell M^1 of the wings. From the Eastern species that lack this cell (*rivularis* O. S., *eucera* O. S.), it may be told by the larger size, the long, angulated radial sector and the conspicuously marked wings.

Rhaphidolabis persimilis, sp. n.

Very similar to the genotype, *R. tenuipes* O. S., but differing very strikingly in the structure of the male hypopygium.

The pleurites are stout, the proximal face near the base produced into a small, slender, clavate lobe which is provided with numerous long, pale setæ at the tip; the proximal face of the pleurite is produced into a conspicuous, flattened, strongly bifid, pincer-like blade, the outer arm slender, curved, the inner arm flattened into a blade. The pleural appendages are two in number, rather small, of approximately equal length; inner appendage long-oval, densely set with chitinized spines; the outer appendage is flattened, broad basally, the short apex bluntly rounded. The gonapophyses appear as comparatively small chitinized hooks.

Rhaphidolabis tenuipes has the appendages similar but all conspicuously elongated; the flattened blade-like extension of the inner face of the pleurite is here very large, almost contiguous with its mate of the opposite side; this pale blade is subquadrate basally, the outer angle produced into a narrow, slightly curved arm, the margin of which bears numerous, small, appressed teeth. The pleural appendages are slender, the inner one especially so; the outer appendage is broad basally, inconspicuously bifid, the outer arm produced into a long, slightly twisted, flattened blade whose apex is evenly rounded and provided with a few small setæ. The gonapophyses are similar to those in *R. persimilis* but the recurved tips are very long, nearly equal to the stems that bear them.

Habitat.—Virginia.

Holotype.—♂, Difficult Run, Potomac River, October 28, 1917, (W. L. McAtee).

Paratypes.—♂, Great Falls, April 20, 1913, (C. P. Heinrichs); 2 ♂'s, Dead Run, May 10, 1916, (W. L. McAtee); 1 ♂, Virginia, near Plummer's Island, September 29, 1915, (W. L. McAtee).

HEMIPTERA FROM PEAKS ISLAND, MAINE, COLLECTED BY MR. G. A. MOORE.

BY H. M. PARSHLEY,
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During the seasons of 1918 and 1919 my friend Mr. G. A. Moore had brief opportunities for collecting on Peaks Island, in Portland Harbor, and has been kind enough to send to me for study the Hemiptera which he gathered there. This collection proves to be of considerable interest and merits a full report, especially since the published records from this part of Maine are very meagre. Some of the species are additions to the state list; one, *Stygnocoris rusticus*, has never before been found in the United States; and another is the first American representative of the Anthocorid genus *Tetraphleps*.

SCUTELLERIDÆ.

Homaemus aeneifrons (Say). 1 Aug, '18, 4 Aug. '19.
Eurygaster alternata (Say). 3 Aug. '19.

CYDNIDÆ.

Thyreocoris pulicarius (Germar). 8 Aug. '19.

PENTATOMIDÆ.

Peribalus limbolarius Stal. 3 Aug. '18. New to the Maine list.
Mormidea lugens (Fabricius). 23 July, '18.
Euschistus tristigmus (Say). 28 July, '18.
Neottiglossa undata (Say). 27 July, '18.
Cosmopepla bimaculata (Thomas). 26 Aug., '19.
Meadorus lateralis (Say). 1 Aug., '19.
Elasmostethus cruciatus (Say). 4 Aug., '18.
Podisus modestus (Dallas). 8 Aug., '19.
Podisus placidus Uhler. 26 Aug., '19.

NEIDIDÆ.

Neides muticus (Say). 29 July, '18.

LYGAEIDÆ.

Nysius ericæ (Schilling). 2 Aug., '18.
Ischnorhynchus geminatus (Say). 31 July, '18; 10 Aug., '19.
Phlegyas abbreviatus (Uhler). 24 July, '18.
Ligyrocoris diffusus (Uhler). 29 July, '18.
Ligyrocoris contractus (Say). 27 July, '19.
Kolenetrus plenus (Distant). 26 July, '18.

A male of this rare species, new to the Maine list, was found under moss.

Stygnocoris rusticus (Fallén). 31 July, '18; 8 Aug., '19.

This European species has recently been reported from Quebec and Nova Scotia. Its characters are discussed by Barber in one of his valuable papers on the Lygaeidæ,[1] where he makes the comment, "The species has not yet been found within the United States, but it should occur in the mountainous parts of New England and New York." Boreal forms are likely to occur anywhere in Maine, becoming restricted to mountainous regions as their range extends southward.

TINGIDÆ.

Corythucha marmorata (Uhler). 31 July, '19.

Corythucha juglandis (Fitch). 10 Aug., '19.

Corythucha pyriformis, sp. nov.

Membranous portions very clear hyaline, the surface shining; disc of pronotum brown; dorsal veinlets of hood very slightly marked with brown; paranota with a single distinct dark brown spot before middle; median carina with a very indistinct brown spot; lateral carinæ and apex of angulate process white with a brownish tinge. Hemielytra with distinct dark brown basal and apical bands, the latter equal in width to one-third entire length of hemielytron, enclosing three or four large, almost entirely hyaline areoles, the apical row of areoles largely hyaline from apex of wing inwardly. Antennæ, legs except tarsi, and edges of plates forming rostral groove yellow.

Hood slightly higher than median carina and somewhat longer, its height one-half its length, its width not quite one-third width of entire pronotum (14–46); hood pyriform, slightly constricted, sides convergent anteriorly and but slightly concave as viewed from above, anterior lobe thus not distinctly marked off; dorsal areoles very large; hood as seen in profile very slightly rounded above except at ends, moderately arcuate as a whole. Median carina slightly shorter than hood (24–26), slightly and angulately arched, with two rows of areoles at middle, its height less than one-third its length (7–24). Lateral carinæ moderately developed, with three or four areoles, terminating far from base of hood. Paranota large, unusually expanded anteriorly and together widest well before middle. Costal margin of hemielytra nearly straight; marginal spines of paranota and hemielytra few and rudimentary; discal elevations of moderate size, with sharp dorsal edge, not strongly inflated; costal area largely triseriate; hemielytra broadly rounded at apex. Antennæ with numerous setæ. Length ♂ 4.08 mm.; width 2.34 mm.

Holotype ♂, Peaks Island, Maine, 31 July, '19, (G. A. Moore), in my collection. Paratype ♂, Franconia, New Hampshire (Mrs. A. T. Slosson), in Mrs. Slosson's collection.

This species is closely related to *pruni* Osborn and Drake, although by following Gibson's key[2] strictly it runs to *hoodiana* Osborn and Drake. From the former it may be distinguished by the structure of paranota and hood, the slight development of marginal spines, and broader form. The latter, known only from Oregon, is described as larger (length 4.3 mm.), with strongly constricted hood.

Melanorhopala clavata Stal. 26 Aug., '19.

1. Concerning Lygaeidæ.—No. 2. Jour. New York Ent. Soc., Vol. 26, 1918, p. 53.
2. The Genus Corythucha Stal. Trans. Am. Ent. Soc., Vol. 44, 1918, p. 74.

NABIDÆ.

Nabis subcoleoptratus Kirby. 29 July, '18.
Nabis ferus (Linné). 31 July, '19.
Nabis roseipennis (Reuter). 25 July, '18; 1 Aug., '19.

There is difference of opinion concerning what I take to be the short-winged female of this species. Some are inclined to consider that such specimens represent the *Nabis inscriptus* of Kirby, as redefined by Reuter,[3] but the only distinctive character given by the latter author, applicable to the female, is the short first antennal segment, and I have yet to see a specimen exhibiting this feature; moreover, Reuter states that *inscriptus* is very similar to brevis, from which it is distinguished by its smaller head and less prominent eyes, and, it would seem, its shorter first antennal segment.

Nabis rufusculus (Reuter). 26 July, '19.

Certain of the commonest species of *Nabis* present perplexing difficulties in determination. It is hoped that the following key to the north-eastern species will aid in identification of specimens and serve to draw the attention of students to these interesting forms. Some time ago I was privileged to spend an evening with my friend H. G. Barber in the study of his collection and MS. notes on this group, and with his permission I have incorporated in this synopsis the pertinent results of that conference. Subsequent study has shown that Reuter's subgeneric criteria are of great value in understanding the group, and that the male genital characters, emphasized by Reuter, should not be neglected.

1. Body in large part shining black; head distinctly and obliquely narrowed behind eyes; front femora without spines; wing cell with hamus arising from origin of decurrent vein (Subgenus *Nabicula* Kirby); length 9-10.5 mm ..... *subcoleoptratus* Kirby.
   Body wholly or in large part pallid or brown; head parallel or nearly so behind eye ..... 2.
2. Front femora with minute spines below; wing cell with hamus; connexivum more or less distinctly spotted; femora spotted, annulate at apex; tibiæ annulate (Subg. *Hoplistoscelis* Reuter); length 6.4–7 mm ..... *sordidus* Reuter.
   Front femora without spines; connexivum usually not spotted ..... 3.
3. Femora with a subapical dark ring; wing cell without hamus; hind lobe of pronotum distinctly punctate (Subgenus *Lasiomerus* Reuter); length 8–9.5 mm ..... *annulatus* Reuter.
   Femora without ring; wing cell with hamus; hind lobe of pronotum almost or quite impunctate ..... 4.
4. Form elongate; short-winged forms with hemielytra less than three times length of scutellum; first antennal segment generally about as long as head; hamus arising very near or at origin of decurrent vein; long-winged forms extremely rare (Subgenus *Dolichonabis* Reuter) ..... 5.
   Form broader, more or less ovate; short-winged forms usually with much longer hemielytra; first antennal segment generally shorter than head; hamus arising from decurrent vein; long-winged forms common as a rule (Subgenus *Nabis* Latreille) ..... 6.

3. Bemerk. ueb. Nabiden, Mem. Soc. Ent. Belgique, Vol. 15, 1908, pp. 87–130.

5. Form very narrow; head about five times longer than wide between eyes; hemielytra in short-winged form rounded at apex, membrane lacking; length 9–12.5 mm ..... *propinquus* Reuter..
   Form broader; head about three times longer than wide between eyes; shortened hemielytra truncate at apex, membrane present; length 7.5–8.75 mm ..... *limbatus* Dahlbom.
6. Hemielytra in long-winged form without three brown dots; undeveloped hemielytra much shorter than abdomen; dorsal surface of abdomen dark brown, margin of connexivum and single or double median stripe pale; length 8–9 mm ..... *flavomarginatus* Scholz.
   Hemielytra in long-winged form with three brown dots, one on disc of corium, two on membranal suture; undeveloped hemielytra about as long as abdomen; dorsal surface of abdomen without median stripes ..... 7.
7. First antennal segment very slightly longer than anteocular portion of head; dorsal surface of abdomen black; tibiæ with black dots; copulatory hooks of male with large semicircular short-pointed blade and short stem (*fide* Reuter) ..... *inscriptus* Kirby.
   First antennal segment much longer than anteocular portion of head ..... 8.
8. Colour gray; form narrow; markings of posterior surface of front and middle femora tending to become a transverse striping; tibiæ immaculate ..... 9.
   Colour reddish to dark brown; form broader; femora conspicuously spotted, less tendency to striping ..... 10.
9. Anterior femora extending beyond apex of head; copulatory hooks of male with large semicircular blade and stem broadened basally; length 6.5–8.5 mm ..... *ferus* Linné.
   Anterior femora not reaching apex of head; copulatory hooks with small elongated blade and broad arcuate stem; length 6–6.5 mm. (recently introduced from Europe) ..... *brevis* Scholz.
10. Posterior tibiæ dotted; colour dark brown; membrane in short-winged form with closed cells; hooks with small triangular blade and long, broad, undulated stem; length 6.5–8.5 mm ..... *roseipennis* Reuter.
    Posterior tibiæ immaculate; colour pale reddish brown; membrane in short-winged form without closed cells; hooks with large, semicircular long-pointed blade and short stem; length 5.6–7 mm. ..... *rufusculus* Reuter

ANTHOCORIDÆ.

Genus **Tetraphleps** Fieber.

Fieber, Wien. Ent. Monat., Vol. 4, 1860, p. 262, Pl. 6, Fig. F; Id., Eur. Hem., 1861, pp. 37–38, 135–136.

Reuter, Monog. Anthoc., 1884, p. 56, 85.

Slosson, Ent. News, Vol. 17, 1906, p. 326.

Body finely pubescent; eyes slightly distant from pronotum; first rostral segment not extending beyond insertion of antennæ; second antennal segment clavate, third and fourth fusiform. Sides of pronotum explanate and suddenly curved inward anteriorly, extending more or less beyond level of base of pronotal collar. Membrane with four distinct veins. Metasternal canals nearly or quite straight, very slightly oblique, tending posteriorly, prominently

elevated and free apically, the longitudinal line extremely fine, very slightly curved, forming a right angle with the canal.

This genus is distinguished from *Anthocoris* Fallén especially by the explanate lateral margins of the pronotum, more distinctly punctate hemielytra, and the apical prominence of the metasternal canals.

North American species of this palaearctic genus are here recorded for the first time, although Mrs. A. T. Slosson in her tenth Mount Washington list includes "Tetraphleps, n. sp." Finding an example of this genus among Mr. Moore's material, I wrote Mrs. Slosson in regard to the matter, and I am indebted to her kindness for the privilege of examining the specimen (determined as above by Heidemann) which served as a basis for the Mt. Washington record. This proves to be distinct from the Peaks' Island specimen. Mr. Van Duzee has kindly sent for study an Ontario example, identical with the Peaks' Island individual, which he had independently recognized as undescribed. Both species are distinct from the old world forms, and are characterized herewith.

Tetraphleps americana, sp. nov.

Dark piceous; head, pronotum, and scutellum concolorous; second antennal segment more or less distinctly paler at middle. Hemielytra light brown, variegated; apex of clavus, corium and embolium inwardly, most of cuneus, and the sutures and veins darker; membrane smoky brown, basal and two lateral spots, and vittæ following veins white; membranal suture polished, broadly black from apex of clavus to origin of outer vein. Ventral surface and legs dark piceous; apices of femora, thoracic sterna, pleura, and epipleura (of hemielytra) paler. Rostrum piceous or black.

Dorsal surface shining, with conspicuous slightly curled pale pubescence and a few long, erect black setæ on head, pronotum, and scutellum. Head elongate (23–20 including eyes, excluding collar); vertex longitudinally rather convex, eyes moderately prominent, the transverse diameter of an eye not quite equal to one-half width between eyes (5–11); length of anteocular portion slightly more than twice the length of an eye. Juga strongly constricted before insertion of antennæ, compressed and prominent at apex; anterior and of tylus rounded, apex of head thus bi-emarginate. Rostrum extending well beyond front coxæ, second segment becoming slenderer before middle, more than twice length of third (30–14). Antennæ with fine pale pubescence and rather numerous long erect setæ, longer than head and pronotum together (52–45); first segment reaching middle of expanded portion of juga; second segment in length equal to width of head including eyes, enlarged in apical third; third almost cylindrical; fourth fusiform, thicker than second at apex; third and fourth equal in length, together longer than second (26–20). Pronotum obsoletely rugulose, with sparse, minute, but sharply distinct punctation posteriorly; length on median line two-fifths width at base; posterior margin broadly rounded at middle; lateral margins straight, strongly convergent, slightly rounded anteriorly; explanate portions very narrow, scarcely reflexed, reduced to a fine carina behind middle, extending anteriorly but little beyond level of base of collar. Scutellum polished, slightly tumid at base, transversely depressed just behind middle, transversely rugulose at apex. Hemielytra slightly narrower than abdomen at base of cuneus (♀), apex of latter acute; length of membrane be-

yond level of cuneal apices distinctly less than length of cuneus; veins of membrane distinct, variable, connected apically by a very feeble arcuate vein. Length ♀ 3.35–3.67 mm.; width 1.39–1.50 mm

Holotype.— ♀, Peaks Island, Maine, 3 Aug., 1919, (G. A. Moore), in my collection.

Paratype.— ♀, Ottawa, Canada, 1 Sept., 1905, (A. Gibson) (bears also label reading Gibson 7–21–12), in Van Duzee's collection.

This species is especially distinguished by the very narrow explanate margins of the pronotum, which do not extend forward to the middle of the pronotal collar and turn sharply inward and backward as they do in the palæarctic *bicuspis* Herrich-Schaeffer (*vittatus* Fieber). The proportions of antennal and rostral segments are somewhat different, the surface is more shining, and the fine pubescence of the dorsal aspect is twice as long in *americana*. Through the kindness of Mr. E. H. Gibson I have had for comparison a fine series of *bicuspis*, collected and determined by Montandon.

Tetraphleps uniformis, sp. nov.

Similar to *americana* except in the following characters:

Colour almost uniform light brown, head a shade darker, hemielytra a shade lighter. Membrane light smoky brown, with a very vague paler area at base and one along middle portion only of each vein. Tibiæ inwardly and apices of femora pale.

Head excluding collar and including eyes as long as broad; the diameter of an eye distinctly less than one-half width of vertex (5–13); length of anteocular portion distinctly less than twice the length of an eye (12–8). Antennæ long and slender, much longer than head and pronotum together (60–45); first segment reaching almost to apex of juga; second segment longer than width of head including eyes (24–22). Pronotum distinctly transversely rugulose in basal area, the punctures here most extremely fine. Basal emargination very obtusely angulate, not rounded (possibly a variable character). Lateral explanate margins very narrow, but appreciably reflexed. Apex of cuneus narrowly rounded. Membrane long, its length beyond cuneal apices equal to length of cuneus. Length ♀ 3.68 mm.; width 1.46.

Holotype.— ♀, Mt. Washington, New Hampshire (Mrs. A. T. Slosson), in Mrs. Slosson's collection.

This species may be distinguished from *americana* by its pale, uniform coloration and by the proportions of head, antennæ, and membrane. Probably the American forms will be found to occur on coniferous trees, since the European *T. bicuspis* is reported as frequenting firs and larches in England.

Van Duzee has communicated to me his opinion that Provancher's description[4] of *Teiraphleps canadensis* seems to refer to a true Tetraphleps, although the specimen bearing this name in the Provancher collection is a species of Lyctocoris. The mention of hemielytra "à coin fort long" and membrane "avec 4 nervures longitudinales très distinctes" would favour this opinion, but on account of the omission of more important characters it is hardly possible to reach a certain conclusion. Provancher's description is scarcely detailed enough for specific recognition, and even as far as it goes it fails to apply closely to either of the species characterized above.

4. Pet. Faune Ent. Can., Vol 3, 1886, p. 90.

Triphleps insidiosa var. *tristicolor* White. 29 July, '18. New to the Maine list.

MIRIDÆ.

Collaria meilleurii Provancher. 29 July, '18; 1 Aug., '19.

Miris dolabratus (Linné). 24 July, '18.

In his exhaustive accounts of this species,[5] Professor Osborn advances the hypothesis that it is an introduced form, having reached this country about 1800, but it seems to me at least equally probable that it is truly holarctic. Horvath[6] includes *dolabratus* in his list of species which owe their presence here "non à une importation artificielle," adducing divers general considerations not touched upon by Osborn. With reference to the five arguments proposed by the latter, we may note that the early records of Hemiptera omit also many very common and certainly native forms and are in general too fragmentary to have much weight in the matter; that the indications of "a gradual westward and southward dispersal" may possibly be correlated with the spread of interest in the Hemiptera rather than with the movements of the species; and that the presence of *dolabratus* in the interior of British Columbia (Lillooet) and in wild parts of northern Maine (Traveller Mt.), according to records which I have published, is not very likely to be due to the introduction of cultivated grasses from Europe. The species occurs in Siberia, as well as in Europe, and we should await further evidence from the interior of British America and from Alaska before considering the question as settled.

Stenodema vicinum (Provancher). 24 July, '18; 3 Aug., '19.

Platytylellus insitivus (Say). 4 Aug., '19.

Pithanus maerkelii (Herrich-Schaeffer). 30 July, '18; 31 July ,'19.

Another species which may be either holarctic or introduced.

Neurocoplus nubilus (Say). 31 July, '18.

Phytocoris lasiomerus Reuter. 3 Aug., '19.

Phytocoris pallidicornis Reuter. 8 Aug., '19.

Phytocoris eximius Reuter. 6 Aug., '19.

Phytocoris tibialis Reuter. 3 Aug., '19. New to the Maine List.

Phytocoris mundus Reuter, var. 31 July, '18.

Adelphocoris rapidus (Say). 31 July, '19.

Poeciloscytus basalis Reuter. 3 Aug., '18.

Capsus ater (Linné). 24 July, '18.

Coccobaphes sanguinareus (Uhler). 10 Aug., '19.

Lygus pratensis var. *oblineatus* (Say). 3 Aug., '18.

Lygus pabulinus var. *signifer* Reuter. 27 July, '18; 10 Aug., '19.

Lygus confusus Knight. 10 Aug., '19.

One male and two females of this species, hitherto known only from the single type and an associated female. Knight has studied and determined these specimens.

Lygus communis Knight. 3 Aug., '19.

Lygus omnivagus Knight. 27 July, '18.

Lygus belfragei Reuter. 2 Aug., '18; 28 July, '19.

5. The meadow plant bug, Bull. Maine Agr. Exp. Sta., No. 276, 1919. The meadow plant bug, Miris dolabratus, Jour Agr. Research, Vol. 15, 1918, pp. 175–200.

6. Rels. entre faunes Hém. Eur. et Am., Ann. Mus. Nat. Hungarici, Vol. 6, 1908, pp. 1–14.

The second specimen recorded has the clavus entirely dark and the apical dark spots of corium larger than usual though, as is characteristic of the species, they fail to reach the lateral margins.

Lygus hirticulus Van Duzee. 29 July, '18.

Camptobrochis nitens Reuter. 8 Aug., '19.

Camptobrochis sp. 30 July, '19.

Determined by Knight, who is at work on the genus.

Monalocoris filicis (Linné). 29 July, '18; 10 Aug., '19.

Hyaliodes vitripennis (Say). 30 July, '19.

Dicyphus agilis (Uhler). 30 July, '18.

Dicyphus famelicus (Uhler). 26 Aug., '19.

Strongylocoris stygicus (Say). 6 Aug., '19.

Pilophorus amoenus Uhler. 31 July, '18.

Lopidea media (Say). 29 July, '19.

Diaphnidia pellucida (Uhler). 30 July, '19; 4 Aug., '18.

Orthotylus flavosparsus (Sahlberg). 31 July, '18.

Orthotylus cruciatus Van Duzee. 2 Aug., '18.

Ilnacora malina (Uhler). 3 Aug., '19.

Onychumenus decolor (Fallén). 26 July, '19.

Plagiognathus spp.

Several species which cannot be determined at present.

Campylomma verbasci (Meyer-Dür). 29 July, '18.

GERRIDÆ.

Gerris marginatus Say. 28 July, '18; 8 Aug., '19.

Limnoporus rufoscutellatus (Latreille). 8 Aug., '19.

NOTES ON THE LARVÆ AND PUPÆ OF CERTAIN PTEROPHORID SPECIES. (LEPID.).*

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In the vicinity of Chelsea, Que., a small village on the Gatineau River about nine miles north of Ottawa, I found the larvæ of four Pterophorid species quite abundant during the latter half of May, 1919. Two species, *Pterophorus elliotti* Fern. and *P. eupatorii* Fern., occurred on *Eupatorium;* two others, *Pterophorus homodactylus* Wlk. and *Trichoptilus lobidactylus* Fitch. fed on the terminal buds of a *Solidago* species, the latter being very numerous, the former comparatively rare.

Dr. Dyar (1898, Psyche, VIII, 249) has already published notes on the larval and pupal stages of three of these species, viz., *T. lobidactylus*, *P. elliotti*, and *P. eupatorii;* in the same paper he is inclined to doubt the specific distinctness of *P. homodactylus* from *P. elliotii*, which is not to be wondered at when the great similarity of the adults is taken into consideration. Dr. Dyar is correct in considering the larval description of *homodactylus* published by Fernald in his monograph of the Pterophoridæ (p. 41) to be that of *elliotti;* both larva and pupa of the true *homodactylus* (the *Solidago* feeder), however, show excellent characters whereby they may be separated from *elliotti* and the two are undoubtedly distinct species.

I append my notes on the larvæ and pupæ of all four species as they serve to amplify in some instances Dr. Dyar's notes; the figures of the pupæ show the very characteristic arrangement of tubercular setæ and secondary hairs, a feature quite constant in each species.

Trichoptilus lobidactylus Fitch.

Larva (full-grown).—Head ochreous. Body cylindrical, green, with slightly darker mediodorsal line, due to the dorsal vessel showing through the integument, and containing on each segment centrally a minute black dot; several other similar black points are scattered with more or less regularity over the integument, the most constant being a single one midway between tubercles II and III and another, rather linear in shape, before the spiracle. Subdorsally there is a series of large, brownish, rectangular, chitinous patches extending across the major portion of each segment and containing tubercles I and II which are represented by two long brownish setæ, arising from the centre of each patch, very glutinous, swollen irregularly several times during their length and club-shaped at their tips; the posterior portion of each patch contains two minute, whitish, club-shaped setæ. Tubercle III is represented on the abdominal segments by a single long brownish seta, a short anterior whitish one and a minute posterior hair (?IIIa of Dyar). Tubercle IV+V, directly below the spiracle, consists of an anterior shorter and a posterior longer clubbed white seta arising from a brownish base: there are usually also two further minute white clubbed hairs situated respectively on the ventral and on the posterior margins of this dark base. Ventral to the tubercles and on the posterior margin of each segment are generally several minute white clubbed hairs. A single white unclubbed hair arising from a dark base and surrounded by other minute hairs probably represents tubercle VI and two or three small hairs at the base of the prolegs constitute tubercle VII.

On the thoracic segments the dorsal setæ show some variation from that normally found on the abdominal segments; on the mesothorax tubercle I+II consists of two long setæ and one minute white one whilst on the metathorax only a single long dorsal hair is found. On both segments tubercle III shows two long setæ. The prothorax has a row of six long hairs along the anterior margin with a second row of six immediately behind these; the dorsal area corresponding to the prothoracic plate is covered with fine, minute, white, clubbed hairs. Ventrad and anterior to the spiracle is a tubercle bearing three hairs. All spiracles pale, brown-ringed. Length 10 mm.

The arrangement of tubercular hairs as listed above differs in several points from Dr. Dyar's figure of the fifth abdominal segment of this species (1899, Ent. Rec. XI, pl. 1, Fig. 1) but this is in the main due, I believe, to slight inconstancy in the number of small white secondary hairs which may occur on each primary tubercle; Dr. Dyar's figure accentuates these secondary hairs, giving the impression that they are nearly as long as the primary, dark ones, which was far from the actual case in all specimens examined by me.

Pupa (Fig. 1).—Rather bluntly truncate at apex with four short horns arising from the base of the antennal and eye-sheaths and a distinct sub-dorsal ridge extending as far as fourth abdominal segment. Colour green, with the horns and surrounding area extending over the prothorax vinous pink; a large,

*Contributed from Entomological Branch, Department of Agriculture, Ottawa, Canada.

pink, dorsal patch is also present on each of the third and fourth abdominal segments (not segments 4–5 as stated by Dr. Dyar). The wing-cases are darker green than the remainder of the pupal integument and possess three more or less complete parallel rows of minute white clubbed hairs; the sheaths of the legs and mouth-parts are not very clearly differentiated and are well sprinkled with minute white warts or lenticles, particularly numerous on the eye caps. The tubercular setæ of the larval stage are present, tubercles I and II being situated on the subdorsal ridge and particularly prominent on the pink-coloured segments. The prothoracic plate and the dorsal portions of the other thoracic segments are heavily sprinkled with small white lenticles; these lenticles on the abdominal segments are generally restricted to the area contiguous to the tubercular setæ, this area being bounded posteriorly by a row of four or five short white clubbed hairs placed at regular intervals. The cephalic portion of the modified tenth abdominal plate contains a cluster of minute pinkish hairs and the cremaster is composed of a larger cluster of similarly coloured, glutinous hairs.

Pterophorus homodactylus Wlk.

Larva (full-grown).—Head pale greenish ochreous. Body light green with dorsal ochreous line broken in the centre of each segment so that the anterior portion tends to form a short inverted Y, and the posterior portion, commencing as a fine line, thickens into a small elongate diamond-shaped patch, again narrowing at the rear of each segment. A broken, subdorsal, ochreous line is also present, situated dorsad to tubercle III and curved downward on the posterior portion of each segment; traces of a spiracular line are present on the thoracic segments.

The hair arising from the tubercles is long, dull-white and slightly barbed; the normal arrangement of setæ on an abdominal segment is as follows:—tubercles I and II are distinct but contiguous; I has four long subequal setæ, II bears two similar ones and a further short posterior one, pointing backward. Tubercle III shows one long central seta and two shorter anterior ones, bent forward. On the first seven abdominal segments a single hair on the posterior margin of the segment dorsad to the spiracle probably represents IIIa. Tubercle IV+V is very large and situated directly on the lateral flange; it bears about twelve hairs, mostly long. Directly behind them is a tubercle bearing two medium-sized hairs and two short ones; this is presumably IIIb of Dyar. Tubercle VI, below the flange, bears ten to twelve hairs and VII is represented by several hairs at the base of the prolegs. The thoracic segments show the usual modifications: on the mesothorax I+II bears three long, subequal hairs and one short anterior hair and on the metathorax this number is increased by a single moderately long hair; both segments show a single hair directly posterior to this group. Tubercle III shows four setæ of which the central one is the longest; in line with the abdominal spiracles near the rear edge of the segment is a tubercle which bears one medium hair and one small hair pointing backwards (?IIIb). The prothoracic plate is not well defined; two large patches of white hair project over the head; behind these are two long single hairs and on the posterior portion three tubercles, the central one bearing two hairs and each lateral one three. Two large lateral tubercles with numerous hairs are

present, the raised spiracle being situated posterior to the upper one near the rear margin of the segment. Length 14 mm.

Pupa (Fig. 2).—Pale green, with long, white, subequal hairs; wing-cases *smooth* with fringe of short hair only on margin of primaries. The ends of the leg sheaths project free but unequally above the fifth and sixth abdominal segments; the inner sheaths (prothoracic legs) reach to the rear edge of the fifth segment, the outer ones (mesothoracic) to the middle of the sixth segment; beneath these a third pair (metathoracic) projects still further, reaching nearly to the rear edge of the segment. The antennal sheaths are slightly shorter than the prothoracic legs. Apex of pupa sloping gently forward to base of antennæ where a distinct crescentic flange or ridge is formed; a distinct subdorsal ridge is present, becoming obsolete caudad to the second abdominal segment. There is a narrow, cream-coloured dorsal stripe, a broad subdorsal one along the ridge, encircling tubercles I and II, two pale broken lateral stripes, slightly downwardly oblique from front to rear, the lower one broader and crossing tubercle III, and a creamy stripe along the lateral flange.

The tubercular setæ are reduced in number as compared with those of the larval stage; two white hairs arise from both tubercles I and II, tubercle III shows a single hair; tubercles IV and V appear to have become separated, both being situated on the lateral flange, the former with two, the latter with two or three smaller hairs. The number of dorsal hairs is increased on the two posterior abdominal segments and on the thoracic ones tubercle III shows the usual two setæ. There is on the prothorax a posterior row of eight setæ crossing the segment, a single lateral hair and a fringe of hairs across the apex.

Apart from the different arrangement of tubercular hairs and the distinct food plant, the larva may be readily differentiated from that of *elliotti* by the distinctly spiculate nature of the hair, the dull white colour of the same and the fact that the hairs are finer, subequal and considerably shorter than those of *elliotti;* the pupa is recognized by the lack of all secondary hairs and the absence of any fine hairs on the wing cases, except the single row along the lateral margin. In the imago the best point of distinction seems to be the absence in the present species of the dark costal streak above the base of the incision on the primaries; the whole costal portion from base to apex is suffused with smoky brown but there is no trace of the distinct dark costal streak which is clearly visible in *elliotti;* of course, in rubbed specimens an exact determination is most difficult.

Pterophorus elliotti Fern.

Larva (full-grown).—Head pale ochreous. Body light green with long, white, shiny, non-spiculate hairs from the tubercles, the longest being about 4 mm. in length. Except on the prothorax there is a distinct creamy dorsal line broken in the centre of each segment by a small, round dot of the ground colour; traces of a pale subdorsal line are visible crossing tubercles I and II, especially shortly before pupation; a somewhat broken pale lateral line midway between tubercles I and III and a similar spiracular line, broken on the posterior portion of each segment. Prothoracic plate indistinctly defined, the arrangement of setæ on this segment being similar to that found in *homodactylus*. On the other thoracic segments tubercle I+II bears two long, central hairs and three shorter ones, two anterior and one posterior. A single minute hair is situated

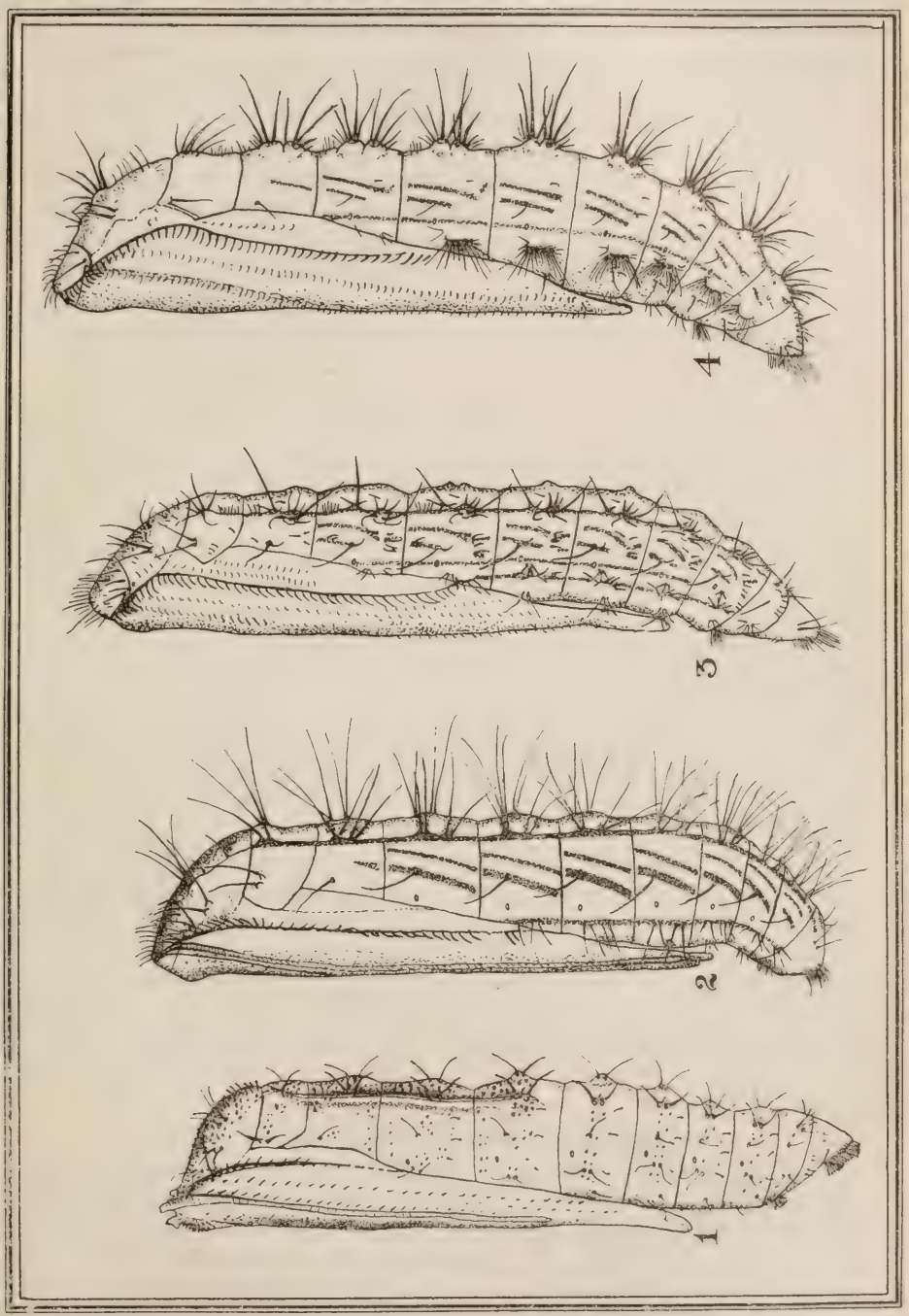

Fig. 1.—Pupa of *Trichoptilus lobidactylus* Fitch.
Fig. 2.— " " *Pterophorus homodactylus* Wlk.
Fig. 3.— " " *Pterophorus elliotti* Fern.
Fig. 4.— " " *Pterophorus eupatorii* Fern.

directly posterior to this group. Tubercle III shows two long central setæ, two minute posterior ones and three longer anterior ones; tubercle IV has four long central hairs and six or seven shorter ones arranged in a crescent around the edge; three short hairs are present on a level with the abdominal spiracle. On the abdominal segments tubercle I bears one long, shiny, smooth, central seta, three anterior shorter ones and one posterior one, very minute; tubercle II is represented by a central, long hair, two shorter posterior ones, pointing backward, and one very short anterior hair; tubercle III bears the same number of setæ as tubercle I; tubercle IV+V shows four long central hairs and about seven shorter ones, arranged in a semicircle around the ventral portion of the tubercle; posterior to this group two short hairs, pointing backward, probably represent tubercle IIIb; tubercle VI is a large one with about twelve hairs of which several are long; several hairs at the base of the prolegs represent tubercle VII. Length 14 mm.

Pupa (Fig. 3).—Very similar to that of *homodactylus*, green with the same pale ochreous markings: the white hairs from the tubercles are, however, shorter and more numerous, the abdominal segments contain a short white centrodorsal hair, midway between tubercles I, and the wing cases, besides the lateral fringe of fine hair, bear several additional rows of still shorter hair; the sheaths of the two posterior pairs of legs are also of equal length. On the first three abdominal segments tubercle I is preceded by a patch of small, white secondary hair, and on these same segments it bears one long central white hair, one anterior shorter hair and a single very short posterior one; on the remaining abdominal segments both the secondary hairs and the anterior tubercular hair are absent. Tubercle II is distinctly laterad to I, is large and bears a long, central, white hair, and five shorter hairs arranged around the circumference; dorsad to tubercle II is a single short hair and laterad to same tubercle, situated in the downward angle of the first pale lateral line, are two small white hairs, one directed forward, the other backward; below these again are two further short hairs on a line with tubercle III; this tubercle is situated on the second lateral line and bears one long hair pointing forward and one short hair directed backward; anterior to III on the first three abdominal segments are two short hairs. Below the spiracle and slightly posterior to same is a small tubercle with three short white hairs (?IIIb) and below this on the flange IV+V appears as a large crescentic tubercle with about eight long white hairs. Three short hairs, well below the flange, apparently represent tubercle VI. The thoracic segments show the usual modifications as well as considerable secondary hair on the posterior dorsal portion of each segment.

Pterophorus eupatorii Fern.

Larva (full-grown).—Head pale reddish ochre. Body pale green, becoming dorsally broadly suffused with purple-red when fully developed; a narrow ochreous dorsal stripe slightly broken centrally on each segment by a triangular green dot; traces of a broad pale subdorsal band crossing tubercles I and II; a narrow lateral line midway between tubercles I and III, bent downward posteriorly; a broken spiracular line. The principal setæ from tubercles I–III are blackish, very slightly spiculate, long and subequal. On the abdominal segments tubercles I and II are in line, contiguous, each with two long black setæ, the former in addition bearing two shorter anterior hairs, the latter with

two similar posterior ones and two very minute ones situated one posteriorly and one anteriorly. Tubercle III bears two long black setæ and one or two short white hairs. Behind the spiracle on the posterior margin of the segment is a minute white hair. Tubercle IV+V bears five long central white hairs and about the same number of shorter ones arranged as a rosette around the central hairs; two short white hairs directed backward are found posterior to this tubercle; VI is very similar in arrangement of setæ to IV+V and VII is as usual represented by several hairs at base of prolegs. On the prothorax a fringe of white hairs overhangs the head; behind this is a row of five black hairs and behind this row again are six black hairs arising from three tubercles, the middle one of which is centro-dorsal. On the meso- and metathoracic segments tubercle I+II bears five long black hairs, and two or three short anterior white ones; posterior to this group are two short white hairs arising from a small tubercle; tubercle III has two long black hairs and several shorter white ones. Length 13 mm.

Dr. Dyar's statement (Psyche, VIII, p. 250) that *cupatorii* larvæ feed on the underside of the leaf, concealed, whereas *elliotti* larvæ feed exposed on the upper side, was not verified by my observations; both species may be taken on either the upper or underside of the leaf, a favourite place being among the terminal half-opened leaf-buds.

Pupa (Fig. 4).—Apple green with purple-red suffusion each side of a pale centro-dorsal stripe; the lateral portions below the subdorsal ridge prominently purple-red with two oblique pale lateral lines and a similar spiracular one. Subdorsal and subspiracular flanges well-developed. Wing sheaths with lateral fringe of hair and further rows of short hair along the antennal and leg sheaths as in *elliotti*. Tubercles I and II on abdominal segments each with five or six finely spiculate white hairs, arranged more or less longitudinally, the central hair being longest. Dorsad to tubercle II is a single minute hair; on the first three abdominal segments dorsally is a small tuft of short hair anterior to tubercle I. Tubercle III, situated on anterior portion of the lower lateral stripe, bears only a single short white seta; posterior to it are two short hairs near rear portion of segment and arranged in line parallel to the segmental incision. Tubercle IV+V, situated on the lateral flange, is prominent, with about twelve long white spiculate hairs, and immediately anterior to it and close to the spiracle are two minute hairs arising from a small tubercle. Tubercles VI and VII are each represented by a couple of short hairs. The thoracic segments show the usual modifications in respect to the number of tubercular setæ.

THE HOUSE CENTIPEDE IN CANADA.

With reference to the records of the House Centipede in Canada, published in Can. Ent., Vol. LII, p. 8, the following may be of interest. While living on King St., in London, Ont., we had occasion to renovate a part of the house which had been used as a "back kitchen." This brought to light specimens of the House Centipede in large numbers, and I killed more than a hundred of them. Some were pinned in a box and shown to Dr. Bethune, the rooms of the Entomological Society at that time being in London. No special notes were made as the occurrence was not thought to be unusual.

A. C. Baker.

SOME RECORDS OF CANADIAN MYRIOPODS.

BY RALPH V. CHAMBERLIN,
Cambridge, Mass.

These notes are based upon a small collection of chilopods and diplopods chiefly from the region of Ottawa and Quebec City, Canada, made by Mr. Frits Johansen and by him sent to me for identification. The collection is especially interesting in containing representatives of two European diplopods not previously known to occur in America, *Blaniulus guttulatus* and *Julus fallax*. It seems desirable to place on record this first known appearance of these forms on this side of the Atlantic, occasion being also taken to list the other species represented in the collection. All specimens were collected in 1919.

Diplopoda.

1. **Polydesmus moniliaris** Koch.

This is a comparatively common form in the eastern United States northward from Pennsylvania through New York and New England. In the collection are two specimens from Ottawa, and one from Quebec City.

2. **Polydesmus serratus** Say.

A species abundant in the United States in the eastern portion and westward to the Mississippi valley. Six specimens, adult males and females, were taken at Ottawa.

3. **Blaniulus guttulatus** Bosc.

This interesting julid occurs throughout Europe, but is most abundant in the western parts, as in France, Belgium and Germany. In those countries it has been regarded as an injurious form, attacking various vegetables such as beans, potatoes, beets, cucumbers and gourds.* Numerous specimens of this form were taken at Quebec City in Sept., 1919.

4. **Julus coeruleocinctus** Wood.

This species is abundant from Pennsylvania northward through New York and New England. In New York particularly it has frequently been accused or suspected of damaging vegetable crops. It is represented in the collection by specimens from Ottawa and Quebec City.

5. **Julus fallax** Meinert.

One adult female of this species was taken at Ottawa. It is a common European form, well-known both upon the continent and in England and Ireland. It has also made its way by ship as far as New Zealand, from where I have a number of specimens.

6. **Parajulus canadensis** Newport.

One specimen from Ottawa. Described originally from Canada, this species has also been found to occur widely in the northeastern United States.

7. **Parajulus venustus** Wood.

In the collection is a male from Alexander Bay, Thousand Islands, N.Y., taken Sept. 1, 1919. It is somewhat darker than is usual in the more typical specimens from the middle western United States, and the gonopods are also slightly variant.

*Cf. Latzel, Die Myriopoden der Ost.-Ung. Monarchis, pt, 2, 1884, p. 253, and J. Ritzema Bos, Tierische Schadlinge and Nutzlinge, 1891, p. 663.

CHILOPODA.

8. **Linotaenia chionophila** Wood.

One specimen from Ottawa. This is one of the most common North American chilopods, abounding particularly in the northern sections. It is common in Alaska and the Pribiloff Is., etc. It is, I believe, not separable from the common European *Linotaenia acuminatus* Leach, the latter name having the priority, but it seems best not to merge the two for the present.

9. **Lithobius forficatus** Linné.

Two specimens from Ottawa. This is common in Europe as well as in North America. It occurs across the northern United States as far as the Sierra Nevada Mts.; but does not occur at present on the Pacific coast.

10. **Sonibius politus** McNeil.

An immature female from Ottawa and an adult male from Quebec City. Previously known from the north-central United States.

11. **Sigibius puritanus** Chamberlin.

One specimen from Quebec City. Common in New England.

12. **Bothropolys multidentatus** Newport.

One specimen from Alexander Bay, Thousand Islands, N.Y. A form common throughout the eastern section of the United States.

A NEW SPECIES OF TYPHLOCYBA (HEMIPTERA HEMOPTERA, TYPHLOCYBIDÆ).

BY J. R. MALLOCH,
Urbana, Ill.

The type of the species described herein is in the collection of the State Natural History Survey of Illinois.

Typhlocyba appendiculata, sp. n.

Male and Female.—Whitish testaceous; greenish or yellowish testaceous in life. Elytra with a moderately large, poorly defined brownish or fuscous spot in each of the cells basad of the cross nervures except the costal cell, and sometimes with a brown streak along the anterior margin of the clavus on its basal half. Body unmarked.

Male.—Hypopygium similar to that of *querci* Fitch, but the two elongate ventral processes are more attenuated at apices and each has a short, thorn-like lateral tooth some distance from apex which is directed laterad.

Female.—Apex of sheath of ovipositor not blackened.

Last ventral segment transverse apically.

Length 3.5 mm. to apices of elytra.

Type, male and allotype, Elizabeth, Ill., July 8, 1917. Paratype, male, Urbana, Ill., July 17, 1916, on oak. Collected by the writer.

This species closely resembles *querci* Fitch, but the spots on the elytra are larger and less clearly defined than in typical *querci*, the male hypopygium of the latter lacks the lateral tooth, and the apex of the sheath of the ovipositor in the female of *querci* is deep black.

DR. C. GORDON HEWITT.

It is with the most profound regret that we have to record the death of Dr. C. Gordon Hewitt, Dominion Entomologist, who died at Ottawa on February 29, 1920, of pneumonia, following a brief, but very severe attack of influenza. He had been attending the meetings of the Conservation Commission in Montreal, and was taken ill on the day of his return to Ottawa, February 20.

By his death Canada has lost one of her ablest men of science, and the Department of Agriculture a most valuable servant, through whose wide knowledge of economic zoology, farsighted judgment and great administrative ability the Dominion Entomological Service has developed to a remarkable extent in its scope and activities since his appointment as Dominion Entomologist in 1909.

An account of Dr. Hewitt's life and work, and a list of his publications, will appear in our next issue.

ENTOMOLOGICAL BRANCH DIVISION OF FOREST INSECTS.

Mr. Ralph Hopping, in charge of forest insect investigations in British Columbia for the Division of Forest Insects, is supervising control operations in the beetle-infested yellow pine of the Cold-water valley and the adjoining district west of Merritt and Canford, B.C. The work is undertaken in co-operation with the Prov. Forest Branch of British Columbia, the Dominion Forest Branch and local lumber companies. The control methods include modified logging operations, the salvage of the timber when this is feasible, and the burning of the slash. Mr. Hopping is having excellent success in organizing this important work, and we entertain great hopes that a large body of fine timber will be saved thereby.

CORRECTION OF TWO GENERIC NAMES IN COLEOPTERA AND HYMENOPTERA.

In the Proceedings of the United States National Museum, Vol. 56, p. 139, et sequa, the writer made premature use of the generic name *Coleomegilla*, its proper publication in another journal having been delayed and finally omitted. The name should be credited to Dr. T. D. A. Cockerell, who supplied the writer with the following note in September, 1918: "Mr. Timberlake asks concerning the name in which I have had in manuscript since 1906 for the genus typified by *Megilla maculata* DeGeer, the name *Megilla* being preoccupied. It is *Coleomegilla*, and if we adopt it the species becomes *Coleomegilla maculata*." (Signed) T. D. A. Cockerell.

On page 190 of the same Proceedings the writer proposed the new genus *Brethesia* for a South American Encyrtid. This name is preoccupied by *Brethesia* Schrottky, and *Brethesiella* is here proposed to take its place, with *Brethesia latifrons* as type, the two included species becoming *Brethesiella latifrons* and *abnormicornis*.

P. H. Timberlake.

Mailed April 30th, 1920.

C. Gordon Hewitt,

The Canadian Entomologist

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CHARLES GORDON HEWITT.

In the death of Charles Gordon Hewitt, Dominion Entomologist and Consulting Zoologist, the biological sciences have lost a leader of exceptional ability. Not only was he held in the highest esteem by his colleagues of the Dominion Entomological Service, but entomologists generally the world over appreciated his brilliant attainments and marked executive ability. Although eminent in entomology his studies were by no means confined to this science. A broad study of economic zoology from the national standpoint occupied a large share of his thoughts particularly during the last four or five years of his life.

During his eleven years of office he developed the Dominion Entomological Service from a very small division, with one assistant and a stenographer, attached to the Experimental Farms Branch, to an important separate Branch of the Department of Agriculture. This development of the Entomological Branch was his most important achievement and the organization he perfected will remain a tribute to his great ability and zeal. The broad development of the Entomological Branch is instanced in the establishment of important Divisions at Ottawa, such as the Division of Field Crop and Garden Insects, the Division of Forest Insects, the Division of Foreign Pests Suppression, and the Division of Systematic Entomology, all under the immediate direction of highly-qualified Chiefs. In addition to these divisions of the work special officers have been given charge of such lines of study as Natural Control Investigations, Insecticide Investigations, and Stored Product Insect Investigations. In the various provinces too, field or regional laboratories have been established with trained entomologists in charge, who study local problems and disseminate information of value to agriculturists, horticulturists, lumbermen and others.

In 1909, Dr. Hewitt recognized the importance of legislation to prevent the introduction or spreading of insects, pests and diseases destructive to vegetation, and as a result Parliament passed the Destructive Insect and Pest Act in May, 1910. Under the regulations of this Act inspectors were appointed to deal with the threatened spread of the brown tail moth in the Maritime provinces, and provisions were made for the prohibition, fumigation or inspection of nursery stock at definite ports of entry. In addition to the brown tail scouting work, which he developed in co-operation with the provinces of Nova Scotia and New Brunswick, he also arranged for the collection in Massachusetts and establishment in eastern Canada of thousands of parasitic and predaceous enemies of the brown tail and gipsy moths. Dr. Hewitt was keenly interested in medical entomology and accomplished much useful work on problems related to the house-fly, mosquitoes, ticks and other animals which spread disease.

He was the author of important books and memoirs. His chief published work is the well-known book on the house-fly of which there were two editions. A smaller book on the same subject appeared later as one of the Cambridge

Manuals of Science and Literature. His departmental publications consist of a series of annual reports (1910-1916), bulletins, and circulars, chief among the latter of which are those dealing with the Honey Bee and the Large Larch Sawfly. Very recently he completed an important work on the conservation of the wild life of Canada, the manuscript for which is now ready for the press. The publication in 1919 of the various parts of an important volume on the insects collected by the Canadian Arctic Expedition, 1913-1918, was brought about under his direction.

Dr. Hewitt's reputation was by no means confined to Canada. In addition to a wide connection among scientific workers in England his outstanding abilities were soon recognized by entomologists in the United States, where economic entomology particularly has reached such a high development. In the year 1913 he was honoured by being elected a Fellow of the Entomological Society of America. In 1915 he was elected President of the American Association of Economic Entomologists. In Canada, in 1913, he accepted the Presidency of the Entomological Society of Ontario and in the same year was elected a Fellow of the Royal Society of Canada. In the following year he was appointed Honorary treasurer of the latter society, which office he held at the time of his death. He was a Fellow of the Entomological Society of London, England; a corresponding member of the Zoological Society of London and Honorary Fellow of the Royal Society for the Protection of Birds, London, England. He was a recognized student of wild life preservation and rendered valued service in the capacity of Secretary of the Advisory Board on Wild Life Protection. In March, 1918, he was elected President of the Ottawa Field-Naturalists' Club for the year 1918-19.

The gold medal of the Royal Society for the Protection of Birds was presented to Dr. Hewitt on March 12th, 1918, in grateful recognition of successful efforts in furthering the treaty between Canada and the United States for the protection of migratory birds.

A short time before his death he was chosen as the first President of the recently organized Institute of Professional Civil Servants. In addition he was President of the Ottawa Boys Home, an ardent supporter of the Boy Scout movement and a Councillor of the Ottawa Humane Society.

Dr. Hewitt was born near Macclesfield, England, on February 23rd, 1885. He was the son of Thomas Henry Hewitt and of his wife Rachel Frost. He received his early education at the King Edward VI Grammar School, Macclesfield, afterwards entering Manchester University, from which institution he received the following degrees: B. Sc. in 1902; M. Sc. in 1903, D. Sc. in 1909. He obtained first-class honours in Zoology at Manchester University, and was university prize man and scholar. In 1902 he was appointed by his alma mater Assistant Lecturer in Zoology, and in 1904-9 occupied the position of Lecturer in Economic Zoology. In 1909 he left England for Canada, having received the appointment of Dominion Entomologist. In 1916, his title was changed to that of Dominion Entomologist and Consulting Zoologist.

On October 11, 1911, Dr. Hewitt was married at Canning, N. S., to Elizabeth Borden, daughter of Surgeon General Sir Frederick Borden, K. C. M. G., Minister of Militia and Defence from 1896 to 1911.

Dr. Hewitt's eminence as a scientist and administrator was widely recognized. As an ardent student of wild life he was deeply interested in the development of game reserves, bird sanctuaries and all plans for the protection of wild life. The versatility of his interests in science, literature, art, music, and social welfare, combined with the charm of his fine character, had endeared him to many personal friends. His remarkable ability and well directed ambitions enabled him to accomplish more in the thirty-five years he lived than is compassed by most men in a long lifetime.

Dr. Hewitt had attended the meetings of the Commission of Conservation, at Montreal, on February 18th and 19th, at which he presented an important paper on "Fur Bearing Animals, their Economic Significance and Future."

Soon after his return to Ottawa on the 20th he was taken seriously ill with influenza; this soon developed into pleural pneumonia and he died about 11 p.m., on February 29, 1920.

The following resolution was passed at a recent meeting of the Council of the Entomological Society of Ontario.

"The Council of the Entomological Society of Ontario have learnt with extreme regret of the unexpected death of Dr. C. Gordon Hewitt, a former President of the Society, and Dominion Entomologist, and desire to place on record their high appreciation of his eminence in this branch of Science and of the notable work that he carried on by establishing field laboratories with capable managers in all the Provinces of the Dominion, in addition to the activities which he directed at the central office in Ottawa. They feel that the Society and Entomological Science in Canada have sustained a great loss which can hardly be over-estimated. Their sorrow in this bereavement is shared by a large number of Dr. Hewitt's friends in the United States as well as by all those who were associated with him in this country.

They wish to convey to Mrs. Hewitt their tribute of sympathy with her in the great loss that she has sustained and their high appreciation of her late husband as a leader and friend."

The senate of his alma mater passed the following resolution:

"The members of the senate desire to express their deep regret at the death of Dr. Charles Gordon Hewitt, formerly a student, graduate scholar, and lecturer in the University. He attained to great distinction by his researches in Entomology and by his great administrative abilities as chief entomologist in the Dominion of Canada.

They feel that by his early death a career of great distinction has been prematurely closed. They desire that a copy of this resolution be sent to his widow and to his father."

Arthur Gibson,

J. M. Swaine.

THE WRITINGS OF THE LATE C. GORDON HEWITT.

COMPILED BY C. B. HUTCHINGS.
Ottawa, Ont.

1905—Note on the Buccal Pits of Peripatus. Memoirs and Proceedings of the Manchester Literary and Philosophical Society. Vol. L, Part 1.

1906—The Cytological Aspect of the Parthenogenesis in Insects. "Memoirs and Proceedings of the Manchester Literary and Philosophical Society Vol. L, Part III.

Some Observations on the Reproduction of the Hemiptera = Cryptocerata. The Transactions of the Entomological Society of London.

An Abnormal Vermiform Appendix in the Rabbit. The Journal of Anatomy and Physiology, Vol. XL.

A Preliminary Account of the Life-history of the Common House-Fly (*Musca domestica* L.). Memoirs and Proceedings of the Manchester Literary and Philosophical Society, Vol. LI, Part 1.

1907—Ligia. Liverpool Marine Biology Committee Memoirs on Typical British Marine Plants and Animals, XIV.

On the Life-History of the Root Maggot, *Anthomyia radicum* Al. Journal of Economic Biology, Vol. II, Part 2.

The Structure, Development and Bionomics of the House-Fly, *Musca domestica* L. Part I. The Anatomy of the Fly. Quarterly Journal of Microscopical Science, Vol. LI, Part 3.

Some Arthrostraca and other Invertebrata from St. Kilda. Annals of Scottish Natural History.

A Contribution to a Flora of St. Kilda: Being a List of Certain Lichens, Mosses, Hepaticæ and Fresh-water Algæ. Annals of Scottish Natural History.

On the Bionomics of Certain Calyptrate Muscidæ and their Economic Significance, with Especial Reference to Flies Inhabiting Houses. Journal of Economic Biology. Vol. II, Part 3.

House Flies. Reprinted from the Annual Report and Transactions of the Manchester Microscopical Society, 1907.

1908—On a New Phytophagous Mite, *Lohmannia insignis*, Berl. var. *dissimilis* n. var., with notes on other species of economic importance. Memoirs and Proceedings of the Manchester Literary and Philosophical Society, Vol. LII, Part 1.

On an Enchytræid Worm Injurious to the Seedlings of the Larch. Journal of Economic Biology, Vol. III, Part 2.

The Biology of House-flies in Relation to the Public Health. The Journal of the Royal Institute of Public Health.

The Structure, Development and Bionomics of the House-fly, *Musca domestica* L. Part II—The Breeding Habits, Development and the Anatomy of the Larva. (Reprinted from Quarterly Journal of Microscopical Science, Vol. LII, Part 4.)

The Large Larch Saw-fly, *Nematus erichsonii*. Journal of the Board of Agriculture, Vol. XV, No. 9.

On the Tent-building Habits of the Ant *Lasius niger* L. in Japan.

Memoirs and Proceedings of the Manchester Literary and Philosophical Society. Vol. LIII, Part 3.

1909—Tent-building Habits of Ants. Ottawa Naturalist, XXIII, 168-170.

The Structure, Development and Bionomics of the House-fly, *Musca domestica* Linn. Part III—The Bionomics, Allies, Parasites, and the Relation of *M. domestica* to Human Disease. Quarterly Journal of Microscopic Science, LIV, Part 3, pp. 347–414

1910—Importance of Entomology in the Development of Canada. Report of the Standing Committee on Agriculture and Colonization, 1909-1910, pp. 17–54.

House-flies and the Public Health. The Ottawa Naturalist, XXIV, pp. 30–34.

Insects Destructive to Canadian Forests. Report of the First Annual Meeting of the Commission of Conservation of Canada, pp. 142–151.

The Brown-tail Moth in Canada. Census and Statistics Monthly, III, pp. 73–74.

House-flies and their Allies. Fortieth Annual Report of the Entomological Society of Ontario, pp. 30–36.

The Larch Sawfly, *Nematus erichsonii*. Fortieth Annual Report, Ent. Soc. Ont., pp. 20–21.

The Teaching of Insect Life and its Practical Importance. Magazine of the West Riding County Council Vacation Course, No. 3, pp. 10–13.

Fruit Pests. Annual Report of the Pomological and Fruit-growing Society of the Province of Quebec, 1909, pp.100–109

House-flies and Disease. Nature, LXXXIV, pp. 73–75

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POPULAR AND PRACTICAL ENTOMOLOGY.

The Imported Currant Worm.

BY L. CAESAR AND G. GARLICK,
Guelph, Ontario.

Pteronus ribesii Scop.

As nearly everybody who is at all familiar with currants and gooseberries has seen the imported currant worm, no description of the insect referred to will be necessary other than to state that it is the common bluish-green caterpillar with black head and numerous black spots on the body, commonly found feeding upon the foliage of gooseberries and some kinds of currants.

It is not our intention in this article to give a full account of the life-history and habits of the insect, but rather to draw attention to some points of interest and value discovered in a study made by the junior author for the senior at Burlington, Ontario, in the year 1919.

Host Plants.—The first point of interest to which we would call attention is that of host plants. In reading over the literature, especially books on Economic Entomology, one finds such statements as "The imported currant worm feeds upon currants and gooseberries" without stating definitely whether there are any exceptions, or "It feeds upon all kinds of currants and gooseberries." Our experiments show that such statements are inaccurate, for in no case have we been able to see any proof that it will feed upon black currant foliage. In the field, we occasionally found eggs upon black currant leaves, but in no case was there any sign of feeding. In cages, larvæ could not be forced by any means in our power to feed upon such foliage and further, the adults could not even be induced to lay eggs upon black currant leaves, though they readily laid upon the leaves of red currants. Moreover, growers informed us that they had never seen any injury to black currants by this species. We believe, therefore, that there is practically no doubt that black currants are immune and that the host plants are red and white currants and gooseberries. Whether there are any species of gooseberries immune or not, we have not yet been able to discover.

Time of appearance of adults in spring.—Before beginning our study we supposed that adults never appeared until the leaves were fairly well expanded, hence it was a surprise to find females present in large numbers in April and laying eggs before the largest leaves were the size of a ten-cent piece, and when the majority of the buds had just burst.

Parthenogenesis.—By cage experiments it was discovered that eggs were often laid by unmated females, and that these hatched just as well as fertilized eggs; in fact, in the later broods the females avoided the males as far as possible and appeared to lay more eggs when unmated. The adults derived from these unfertilized eggs were, in every case, males. This shows, therefore, that though mating is not necessary for the hatching of eggs, it is necessary for the perpetuation of the race.

Length of pre-oviposition period.—In the case of most of our common insects, a period of several days elapses from the time the adults appear until eggs are laid. The imported currant worm and several other allied saw-flies are exceptions to this. In the case of the former insect, oviposition begins in a

few hours after the emergence of the adults. In one instance where careful record was made of the time, the period was only one hour and five minutes.

Where eggs are laid.—The spring adults with very few exceptions lay their eggs in a chain-like arrangement along the main ribs or veins on the under surface of the leaves, the leaves chosen being almost always situated in the central, and lower part of the bush. Females of later generations are not so particular where they lay their eggs and sometimes place them almost indiscriminately over the leaves. This choosing in spring of the central part of the plant for oviposition is from the standpoint of control an important matter; because, when the eggs are hatched the young larvæ feed on the leaves nearby, eating at first little round holes in them and later devouring the whole leaf. They continue to feed gregariously in the central part of the bush until they are half grown, or even more. When the foliage is dense they have often eaten most of the leaves in this part of the bush before any but a close observer would notice that they are present. Accordingly, when they desert the central area and disperse over the outer leaves, they quickly do a very great deal of damage to the plant, especially as they feed ravenously and continue to eat all day long. Hence the fruit grower who delays spraying until he sees the insects at work on the outer leaves is likely to be late to kill them before they completely strip his plants.

Number of broods a year.—It is usually stated that there are only two broods. Our experiments however, show that in 1919 there was a regular spring brood followed by a partial second and a partial third brood, the latter two over-lapping greatly. The second brood of larvæ began to hatch from the eggs about a week before red currants were ripe, and hatching continued for fully a month. The third brood began to hatch a little more than two weeks after the fruit ripened. Adults which produced this brood continued to emerge in cages up into September. Fully half of the larvæ from the first brood remained in their cocoons throughout the year and did not transform into pupæ and adults to produce a second brood. The same thing was true of larvæ of the second brood.

Fortunately the second and third broods appear to be of little importance, for from some not clearly demonstrated reason, the great majority of the larvæ of these two broods died soon after hatching. Therefore, by destroying the first brood but little fear may be felt from the second and third.

Natural methods of control.—Two kinds of parasites were discovered, one a Braconid and the other a Cynipid. In addition to this numerous larvæ and eggs were destroyed by Aphis lions and ladybird larvæ. Another factor in control is the heat of the soil, which destroys many larvæ that fall upon it accidentally or when seeking pupation quarters; and as mentioned above, large numbers of larvæ of the second brood for some unknown reason died soon after hatching. In addition to this may be mentioned the fact that unfertilized eggs produced only males.

Artificial methods of control.—There is scarcely any insect easier to poison than this. We discovered that as small a quantity as one-half pound of arsenate of lead paste in 40 gallons of water would kill small larvæ. Our recommendations are, however, to spray the bushes thoroughly with from one to two pounds of arsenate of lead paste, or from one-half to one pound of arsenate

of lead powder in 40 gallons of water. Apply the liquid as soon as the leaves are well developed on currants or just before the red currants come into bloom, and take special precautions to spray thoroughly the central and lower part of the bush; because this is where the young larvæ feed for a week or more after hatching. If Bordeaux mixture is used, arsenate of lime, a little weaker than either of the above strengths of arsenate of lead, may be used, or Paris green may be substituted at the strength of not more than one-quarter of an ounce to 40 gallons of the Bordeaux. Usually one good spraying is quite sufficient. If a second one is given, it should be about eight or ten days after the first, or soon after the red currants are well set.

It may be worth mentioning in closing that Bordeaux mixture is a most valuable fungicide for currants, both red and black, and has the effect of preventing the foliage from dropping prematurely. In this respect it is much superior to lime-sulphur or the soda-sulphur compounds, and also to any of the sulphur or Bordeaux dusts that the writers are familiar with.

EAST KOOTENAY DIPTERA. TIPULIDÆ—I.

BY C. B. D. GARRETT,
Cranbrook, B.C.

Under the admirable leadership of Dr. C. P. Alexander I have been doing some work on the Kootenay Tipulidæ. The work has but started, but small as it is, the list of specimens is of some interest, for it contains three forms hitherto unknown from Canada. These are *Dicranoptycha sobrina* Will., *Tipula dorsolineata* Doane and *Rhaphidolabis neomexicana* Al. The last is interesting, having been previously taken only at two localities in Colorado and one in New Mexico. The capture of *Stygeropis fuscipennis* Lw. also upsets the view that it is only a late season flyer, since in the Kootenays it is on the wing from May 7th until July 14th.

It is unfortunate that most of the captures have been females only, as these are, in many cases, difficult to determine, but later males will probably be taken, and doubtful names verified or corrected.

The list as it stands is as follows:—

Dicranomyia concinna Will. possibly *D. venusta* Bergroth, April 28.....3,500 feet
" sp. near *halterata* O.S. ♀ only. Sept. 26.....3,500 "
Dicranoptycha sobrina O.S. ♀ only. June 23, '19. July 3 to Aug. 20, '18.....3,500 "
Geranomyia canadensis Western. Dead.....6,000 "
Helobia hybrida Mg. May 2.....3,500 "
Limnophila ultima O.S. Oct. 20.....3,500 "
Nephrotoma erythrophrys Will. June 26.....3,500 "
Rhaphidolabis neomexicana Al. July 21.....3,500 "
Stygeropis fuscipennis Lw. May 7 to 20, July 14.....4,000 "
Tipula angustipennis Lw. May 8 to June 16.....3,500 "
" *dorsolineata* Doane. Aug. 5 to Sept. 4.....4,000 "
" sp. probably *fragilina* Al. ♀ only. 29 Sept. to Oct. 29.....3,500 "
" sp. close to *subtenuicornis* Doane. July 20.....3,500 "
" sp. probably *tenaria* Lw. May 22.....3,200 "
" sp. females only. Aug. 25.....3,500 "
" sp. females only. May 29.....3,500 "

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA). PART IX.

BY CHARLES P. ALEXANDER,
Urbana, Illinois.

The majority of the species considered in this part were secured by Dr. P. W. Claassen in Estes Park, Colorado. Others were taken by Messrs. Frison, Lindley and McAtee. The writer is indebted to all the above gentlemen for the privilege of studying this material. Unless stated otherwise, the types of the species are preserved in the writer's collection.

Elliptera coloradensis, new species.

General coloration dark brown, the mesonotal praescutum brownish black; wings grayish subhyaline, the cord and outer end of cell *1st* M^2 indistinctly seamed with brownish gray; cell *1st* M^2 closed; Sc^2 located before the origin of *Rs*.

Female.—Length 8 mm.; wing 10 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the flagellar segments oval. Head dark brown.

Pronotum obscure brownish yellow. Mesonotal praescutum obscure yellow with three broad, brownish black stripes that are practically confluent, restricting the ground-colour to the humeral region and the lateral margins; scutum yellow, each lobe with two confluent brownish black areas; scutellum obscure yellow; postnotum dark brown. Pleura brownish yellow, the mesepisternum darker; mesosternum between the fore and middle coxæ brownish black. Halteres pale, the knobs a little darkened. Legs with the coxæ and trochanters yellow; remainder of the legs dark brown, the femora paler basally. Wings grayish subhyaline, the costal region indistinctly more yellowish; cord and outer end of cell *1st* M^2 narrowly seamed with brownish gray; veins dark brown; stigma lacking. Venation: *Sc* rather short, Sc^1 ending about opposite two-thirds the length of *Rs*, Sc^2 located before the origin of *Rs; R* pale at the apex; R^1 bent suddenly cephalad at the tip so that cell R^1 is widened at its outer end; deflection of R^{4+5} slightly angulated; *r-m* oblique in position; cell *1st* M^2 closed, a little shorter than vein M^{1+2} beyond it; basal deflection of Cu^1 just before the fork of *M*.

Abdomen dark brown, the pleural integuments paler, the genital segment paler. Ovipositor with the valves elongate.

Habitat.—Colorado.

Holotype—♀, Fall River, Estes Park, August 24, 1919, (P. W. Claassen).

Erioptera (Erioptera) subseptemtrionis, new species.

Male.—Length 4.5 mm.; wing 6 mm.

Similar to *E. septemtrionis* O. S., differing as follows:

General coloration dark brown, the lateral margins of the praescutum and two stripes on the thoracic pleura paler. Legs dark brown, the femoral bases paler. Wings darker with the stigma much more distinct; veins straighter, M^{1+2}, M^3 and Cu^1 showing little tendency to bend toward the wing-tip as in *E. septemtrionis*. Male hypopygium with the spine of the inner pleural appendage much longer than in *septemtrionis*, appressed to the appendage and almost straight; the blade of this appendage is flattened and without a concave depression formed by a short, lateral ridge as in *septemtrionis*.

Habitat.—Colorado.

Holotype—♂, Fall River, Estes Park, August 24, 1919, (P. W. Claassen).
Paratopotypes—2 ♂'s.

Dicranota montana, new species.

General coloration gray, the mesonotal praescutum with three brown stripes; wings pale brown, the stigma dark brown; a faint brown cloud at *r-m;* cell M^1 present; cell *1st* M^2 open by the atrophy of *m.*

Male.—Length 9.3 mm.; wing 9.2 mm.

Rostrum and palpi dark brown. Antennæ rather elongate, dark brown, the flagellar segments somewhat incrassated on their inner face. Head dark brown, presumably gray pruinose in dry specimens.

Mesonotal praescutum gray with three conspicuous, dark brown stripes; scutal lobes dark brown; remainder of the mesonotum and the pleura dark brown. Halteres pale, the knobs slightly darker. Legs with the coxæ dark brown basally, paler brown apically; trochanters brownish yellow; remainder of the legs dark brown, the femoral bases more yellowish. Wings with a pale brownish tinge; stigma oval, dark brown; a faint brownish cloud at the deflection of R^5 and *r-m;* veins dark brown. Venation: Sc^1 ending opposite *r; Rs* short, strongly arcuated, angulated or weakly spurred beyond the base; R^{2+3+4} equal to or shorter than *r-m;* R^{2+3} before *r* longer than this cross-vein; outer deflection of R^2 close to the tip of R^1; deflection of R^5 short to very short; cell M^1 present; cell *1st* M^2 open by the atrophy of *m.*

Abdomen dark brown, the pleural integument pale with a linear brown mark opposite each segment. Male hypopygium with the pleurites short and stout, the outer angles slightly produced; pleural appendage bifid, the outer arm short, fleshy, with numerous setæ, the inner arm longer, flattened into a yellowish chitinized blade. Penis-guard a broad depressed structure, the caudal margin produced into three short points.

Habitat.—Colorado.

Holotype—♂, Fall River, Estes Park, August 24, 1919, (P. W. Claassen).
Paratopotypes—3 ♂'s.

Nephrotoma sphagnicola, new species.

Close to *N. incurva* (Lw.); occipital spot broadly subtriangular; mesonotal scutum trivittate, there being a narrow, black, median stripe in addition to the marks on the scutal lobes; thoracic pleura indistinctly spotted with reddish brown.

Female.—Length 13.5–14 mm.; wing 10.5–11.8 mm

Frontal prolongation of the head yellow, the dorso-median line black; nasus long, black; palpi dull yellow, the last segment passing into brownish. Antennæ with the first segment brown, more reddish beneath; second segment pale; flagellum black 'Head broad, bright orange, the occipital mark broadly rounded or subtriangular, rather indistinct; a small brown spot on either side of the vertical tubercle, adjoining the inner margin of the eye; genæ tinged wth dark brown.

Pronotum dull yellow. Mesonotum pale orange-yellow with three black stripes, the median stripe very broad in front, narrowed behind; lateral stripes short, straight, not connected with the rounded velvety spot laterad of their anterior ends; scutum trivittate with black, a distinct, black, median vitta, in addition to the triangular black areas on the scutal lobes; scutellum brownish,

paler on the sides, with a narrow, blackish median vitta; postnotum orange-yellow, the median area brownish, broader on the posterior portion Pleura yellow, indistinctly spotted with reddish brown; a narrow, almost black line immediately before the base of the halteres. Legs with the coxæ dull yellow, indistinctly brown at the base; trochanters dull yellow; femora dull brownish yellow, the tips darker; tibiæ brown, the tips narrowly dark brown; tarsi dark brown. Wings with a faint yellowish tinge, the costal area but little brighter; stigma dark brown; a narrow brown seam along the cord, passing along both branches of *Cu* to the wing-margin; tip of the wing narrowly darkened; a pale vitreous area in cell *1st* R^1 before the stigma. Venation: cell M^1 broadly sessile; *m-cu* present, located just before the fork of *M*.

Abdominal tergites obscure yellow; segment one with a black basal ring; other segments with the caudal margin blackened, this broadest on segments two to four, more or less produced cephalad medially so as to be almost continuous along the dorso-median line; the black caudal margin is narrow and less distinct on the succeeding segments; lateral margins of the segments broadly dark brown; sternites yellow. Ovipositor with the tergal valves very long and slender, acute, greatly exceeding the sternal valves.

Habitat.—Illinois.

Holotype—♀, Antioch, Lake Co., June 5, 1919, (T. H. Frison).

Paratopotype—♀.

Type in the collection of the Illinois Natural History Survey.

This species was submitted to Dr. Dietz for his expert opinion and he agrees that the fly is undescribed, most closely related to *N. incurva* (Lw.), from which it may be told by the diagnostic characters given above. The types were secured by Mr. Frison in a sphagnum bog, associated with other species of Tipulidæ of northern affinities (*Limnophila poetica* O.S., *Tipula serta* Lw., *Tipula senega* Alex., and others).

Tipula claasseni, new species.

Head and thorax brownish black; wings grayish subhyaline, the base and subcostal cell yellowish; abdominal tergites orange-yellow, trivittate with dark brown; ovipositor with the valves short and fleshy.

Female.—Length 11.8–12 mm.; wing 13–14 mm.

Frontal prolongation of the head rather short, narrowly dark brown above, obscure yellowish on the sides; nasus distinct. Antennæ short, dark brown, the second scapal segment a little paler. Head dark brownish black, paler on the sides of the vertex and on the postgenæ.

Thorax, in alcohol, dark brownish black, in dry specimens possibly pruinose, the dorso-pleural membranes obscure yellow. Halteres light brown. Legs with the coxæ and trochanters brownish black; femora reddish, narrowly tipped with dark brown; tibiæ brown, the tips slightly darker; tarsi brownish black. Wings grayish subhyaline, the base strongly yellow; cells *C* and, especially, *Sc*, light yellow; stigma small, brown; a conspicuous obliterative area before the stigma in cell *1st* R^1 and another in the end of cell *R* that crosses vein M^{1+2} and almost fills cell *1st* M^2. Venation: *Rs* long, longer than R^2 but shorter than R^3; R^{2+3} a little longer than *r-m;* deflection of R^{4+5} short or practically obliterated, the *r-m* cross-vein correspondingly lengthened; cell *1st* M^2 small, pentagonal; petiole of cell M^1 a little longer than *m; m-cu* short.

Abdominal tergites orange-yellow with three conspicuous brownish black stripes, on the subterminal segments the entire sclerites are darkened; basal sternites yellow, the others passing into brown. Ovipositor with all the valves short and blunt, somewhat as in the *bicornis* and *collaris* groups of the genus.

Habitat.—Colorado.

Holotype—♀, Lawn Lake, Estes Park, altitude 11,000 feet, August 27, 1919, (P. W. Claassen).

Paratopotype—♀.

This curious fly might well be mistaken for a male, but the specimens are undoubtedly females. Somewhat similar structures are found in the *collaris* and *bicornis* groups. The species is respectfully dedicated to the collector, Dr. P. W. Claassen.

SUMMARY OF WOOD'S MYRIAPODA PAPERS.

BY HORACE GUNTHROP,
Washburn College, Topeka, Kansas.

We note by Science[1] that Dr. Horatio C. Wood, emeritus professor of materia medica, pharmacy and general therapeutics in the Medical School of the University of Pennsylvania, died January 3, last, at the age of 79. Before taking up the study of medicine, he was interested in natural history, and was a worker in the Academy of Natural Sciences, publishing several papers in the Insecta, and nine on the closely related group Myriapoda. In these latter we have by far the most extensive work done in this country on this group by any individual up to his time, and these papers must rank as the foundation on which all work on the Myriapoda has since been built.

The first of these papers (1)[2] was a preliminary report on the genus *Scolopendra*, and describes four species as new. The next year he issued a general catalogue of the Chilopoda (2) in which two new genera and twenty-nine new species are included. In the following year three papers appeared, the first on the Polydesmidæ (3) includes the descriptions of ten new species, the second one on the Julidæ (4), fourteen new species, and the last (5), two new genera and the same number of species. In 1865 appeared his "Myriapoda of North America" (6), in which there are eighteen genera and ninety-two species listed, three of the latter being classed as new. This is an extensive monograph illustrated with numerous cuts and three plates, two of which are coloured. It discusses the external structure, and brings the systematic side of the subject up to date, reviewing the work of all earlier writers with the notable exceptions of C. L. Koch and Saussure, whose writings must have been unknown to Wood, judging from omissions and the resulting synonyms. The same year he published the one paper he wrote on foreign material (7), describing a new genus (*Oligaspis*) and species (*O. puncticeps*) from Port Natal, and a single new species (*Glomeris bicolor*) from Hong Kong. His work on the group closed with two short papers published in 1867, the first one (8) describing four new species from Texas, and the second (9), six new species from Illinois and California. He retained his interest in insects for some time after this, but after 1875 cellular botany and medicine filled all his time.

1. Vol. 51:106–107. Ja 30, 1920.
2. Numbers in parenthesis refer to bibliography at end.

In all, Dr Wood described four new genera (*Bothropolys*, *Opisthemega*, *Octoglena* and *Brachycybe*) from the United States, and one foreign genus, and a total of seventy-two species from this country, and two from elsewhere, making a grand total of five genera and seventy-four species of Myriapoda to be placed to his credit.

The following is a list of the new species described by Wood from the United States:—

Chilopoda—

Cermatia linceci.
Lithobius bilabiatus.
" *paucidens.*
Bothropolys nobilis.
" *xanti.*
" *bipunctatus.*
Scolopendra castaneiceps.
" *polymorpha.*
" *parva.*
" *byssina.*
" *longipes.*
" *copeana.*
" *bispinipes.*
Cryptops asperipes.
Opisthemega postica.
" *spinicauda.*
Scolopocryptops gracilis.
" *spinicauda.*
" *lanatipes.*
Geophilus cephalicus.
" *brevicornis.*
" *laevis.*
" *bipuncticeps.*
Mecistocephalus quadratus.
" *fulvus.*
" *melanonotus.*
" *limatus.*
Strigamia gracilis.
" *inermis.*
" *bothriopus.*
" *bidens.*
" *laevipes.*
" *taeniopsis.*
" *maculaticeps.*
" *laticeps.*
" *cephalica.*
" *parviceps.*
" *epileptica.*
" *chionophila.*
" *walkeri.*

Diplopoda—

Octoglena bivirgata.
Brachycybe lecontii.
Julus venustus.
" *pilosiscuta.*
" *oregonensis.*
" *immaculatus.*
" *canaliculatus.*
" *laqueatus.*
" *milesii.*
" *cinereifrons.*
" *caeruleocinctus.*
" *hortensis.*
" *virgatus.*
" *caesius.*
" *diversifrons.*
Spirobolus spinigerus.
" *uncigerus.*
" *angusticeps.*
Spirostrephon caesioannulatus.
Polydesmus trimaculatus.
" *corrugatus.*
" *bifidus.*
" *crassicutis.*
" *cerasinus.*
" *eruca.*
" *placidus.*
" *floridus* (var?)
" *haydenianus.*
" *hispidipes.*
" *setiger.*
" *impurus.*
" *dissectus.*

Bibliography of Horatio C. Wood.

(1) 1861. Descriptions of new species of *Scolopendra* in the collection of the Academy. Proc. Phila. Acad., pp. 10–15.

(2) 1863. On the Chilopoda of North America, with catalogue of all the specimens in the collection of the Smithsonian Institution. Jour. Phila. Acad., n. s., Vol. V, pp. 5–52.

(3) 1864. Descriptions of new species of North American Polydesmidæ. Proc. Phila. Acad., pp. 6–10.

(4) 1864. Description of new species of North American Iulidæ. Proc. Phila. Acad., pp. 10–15.

(5) 1864. Description of new genera and species of North American Myriapoda. Proc. Phila. Acad., pp. 186–187.

(6) 1865. On the Myriapoda of North America. Trans. Amer. Phil. Soc., Vol. XIII, pp. 137–248, pls. I–III.

(7) 1865. New Polyzoniidæ, Gervais. Proc. Phila. Acad., pp. 172–173.

(8) 1867. Descriptions of new species of Texan Myriapoda. Proc. Phila. Acad., pp. 42–44.

(9) 1867. Notes on a collection of California Myriapoda, with descriptions of new Eastern species. Proc. Phila. Acad., pp. 127–130.

NOTES ON SOME MOSQUITOES NEW TO CANADA.

BY ERIC HEARLE,
Guelph, Ont.

Psorophora sayi Dyar and Knab.

This beautiful insect has not previously been recorded from Canada, although it is reported from the Atlantic and Gulf states, the Mississippi Valley, Cuba and the Bahamas.

The single specimen obtained by the writer was taken near Jordan, Ontario, on August 3rd, 1916. It was in woods, attempting to bite at 8.30 in the morning. With it were a number of *Aedes canadensis*.

This is a very distinctive mosquito; in the sunlight most of the scales give off vivid purple reflections. The hind tibiæ and some of the hind tarsal segments have many erect, dark purple scales which give a brush-like appearance to these parts. The apices of the hind legs are white: the two distal tarsal segments and part of the preceding one being entirely white-scaled. The abdomen is dark-scaled, the scales having violet reflections. At the apex of each segment, on each side, there is a lateral yellow triangular patch. The venter is yellow-scaled.

Aedes triseriatus Say.

There is no previous Canadian record of this very interesting little mosquito. Howard, Dyar and Knab give its distribution as the United States east of the Rocky Mountains.

The writer found the species to be a fairly common one in woods in Southern Ontario. Females only were taken and these were found to bite fiercely during the day, but collections made after nightfall gave no specimens. Quickness of movement and a highly-strung sense of danger characterizes the species which is a very illusive one.

The writer's specimens were taken at Jordan, Ontario, on August 3rd, 1916. Dr. E. M. Walker kindly loaned for examination specimens of males and larvæ of *triseriatus* taken by him at De Grassi Point, Ontario. The larvæ were obtained from a tree-hole on July 4th, 1917, and the males bear the date June 23, 1917. These were reared from larvæ taken from the same tree-hole.

Aedes triseriatus is a small black and white mosquito in which the markings are very characteristic. The mesonotum has a broad band of dark brown scales running from base to apex and covering the central half. The sides are pure-white scaled. The abdomen is black-scaled dorsally, except for white spots laterally at the base of each segment. The venter is white-scaled, except for apical black bands on the posterior segments. The legs are black and the wings are clothed with black scales.

Aedes aldrichi Dyar and Knab.

While investigating the mosquito problem of the Fraser Valley, B.C. during 1919, the writer found *Aedes aldrichi* to be the dominant mosquito of that district. Previous to this it had been known only from Montana and Idaho.

The extensive development of this species in the Fraser Valley is apparently dependant upon the fluctuation of the river. In years of high freshet, the cotton-wood bottom lands around the river become flooded and *aldrichi* is extremely abundant. The adults bite very viciously and are so small that they can penetrate ordinary screening with comparative ease.

Swarming of males was observed at six p.m. on July 12th, 1919, at Dewdney, B.C. Four or five dozen individuals were hovering in a swarm three or four feet from the ground. The swarm was composed almost entirely of males and was in a place well protected by willow growth.

This small grayish *Aedes* has the thorax clothed with yellowish-gray to pale straw-coloured scales. There is a broad median divided stripe of dark brown scales, and two short lateral markings of the same colour. The abdomen is black, with crisp white basal bands narrowed in the centre and broadening laterally in the posterior segments to form broad triangular patches. The legs are black, and the wings are entirely black-scaled.

Specimens were taken at Mission, B.C., between June 13th and August 3rd. They were found throughout the valley from Hope to Ruskin.

Anopheles quadrimaculatus Say.

It is surprising that there are no previous Canadian records of this mosquito, as the writer found it to be fairly common in some parts of Southern Ontario. Specimens were taken at St. Catharines, Ontario, on August 24, 1916, and at Jordan, Ontario, on August 4, 1916. At the latter place *quadrimaculatus* was very abundant. It was not found at Guelph, where *occidentalis* is the common Anopheline.

A. quadrimaculatus is a gray-brown species in which the brown mesonotum is clothed with yellowish hair scales: the abdomen is grayish-brown and has many silky, pale hairs. The legs, proboscis and palpi are uniformly dark-scaled, save for yellow scales at the knees and the apices of the tibiæ. The wings are marked with four dark spots, these being at the forks of the second and fourth veins, at the base of the second vein and at the cross-veins. The wing fringe is uniformly dark-scaled.

Anopheles occidentalis and *A. walkeri* somewhat resemble this species, but the former has a yellow coppery patch on the wing fringe, at the apex; and the latter has less distinct black spots on the wings and has white rings on the palpi.

REMOVING POLLEN FROM BEES.

It is well known to all persons who have made a collection of bees that a large proportion of specimens in some genera—notably *Andrenidæ* and *Megachilidæ*—are so heavily loaded with pollen that their beauty as cabinet specimens is much impaired, and also that some of the characters which need to be examined in order to identify them properly are covered and concealed.

Last season I experimented to find some practical and easy way to remove the pollen without injury to the specimens, and I succeeded so well that I thought that some of your readers would like to know about it.

I take a wide-mouthed bottle holding some five or six ounces and fill it about two-thirds full of gasoline, drop the bees in and cork tightly and shake vigorously for two or three minutes, then pour off the liquid into another bottle and empty the bees out on to a sheet of blotting paper. In a few minutes the gasoline will all evaporate and leave the bees perfectly clean. When wholly dried out they should be examined with a lens, and if not clean give them another bath of fresh gasoline This second bath will rarely be necessary if thoroughly done the first time In case some very shaggy species should not look fluffy enough, a little brushing with a small, soft paint brush will completely restore the natural appearance Some pollens are more difficult than others to remove That of viburnum is the worst I have seen yet, but it will come off. I am sure that any one who will give this plan a thorough trial will be more than satisfied. Old dried specimens cannot be cleaned.

N.B.—Do not fear to shake vigorously. You cannot injure them, and it is necessary to shake well in order to rinse them completely.

E. J. Smith, Sherborn, Mass.

CONCERNING THE DISTRIBUTION OF NORTH AMERICAN. CICADELLIDÆ (HEMIP.).

BY GEO. W. BARBER,
U. S. Bureau of Entomology, (*) Washington, D.C.

Some time ago a study was pursued to determine what relation the distribution of N. A. Cicadellidæ had to the life zones of N. A. fauna. It was soon found, however, that under our present knowledge of the distribution of the insects of this family, such a study would lead to considerable confusion, and it was, therefore, discontinued for the present.

Certain information did develop, however, concerning the distribution of the Cicadellidæ, and it is here presented as perhaps adding something to our conception of this family:

Undoubtedly some localities in the distribution of the species have been overlooked, but an endeavor has been made to know the distribution of each species so far as it has been recorded in literature.

*Published by permission of the Chief of the Bureau of Entomology.

The Cicadellidæ is represented in America north of Mexico, by 70 genera through which are distributed some 773 species now held to be distinct. On the whole, very little has been done to determine the fauna of any given locality. Several lists, however, have been published and for at least six states the family has been collected extensively and recorded. There may be mentioned the New York and Maine lists by Prof. Osborn, the Tennessee list by De Long, the Wisconsin list by Saunders and De Long, the Missouri list by Gibson and Cogan, and the South Carolina list of Lathrop. In addition to these more extensive lists there have been several minor lists, which need not be mentioned here.

Of the 773 recognized species, some 294 have been recorded from but one locality, the locality of the type and apparently never recovered. The localities of these follow:

"Am. Sept."	1	Tenn	19
Boreal Am	1	Wisc	12
Carolina	1	Iowa	4
Maine	5	Arkansas	1
N. H	1	Texas	9
N. Y	3	Kansas	3
N. J	3	Nevada	3
Md	2	Utah	6
D. C	3	Colorado	62
Va	2	N. Mexico	6
N. C	1	Arizona	15
S. C	6	Calif	70
Ga	3	Washington	4
Fla	20	Oregon	4
Penn	4	Canada	3
Ohio	2	Manitoba	1
Ill	5	Vanc. Isd	1
Mich	1	Alaska	5
Kentucky	1	Greenland	1

Total—294.

The number of species in addition to the above list that have been recorded from certain of the General Geographical regions may be summed up in the following list:

Generally distributed throughout the U. S. and Canada	32
Generally distributed throughout the U. S	24
Generally through Atlantic States	33
Generally through Northern States	72
Occurring generally East of the Rocky Mountains	134
" " through the Southern States	52
" " " " Middle Western States or great plain region.	25
" " West of the Miss. River	5
" " through Rocky Mountain Region	60
" " in the South West	27
" " in the North West	3
" " in the Pacific slope	10

The number of species that have been recorded from the several states, territories and provinces is here enumerated:

Maine	151	La	8
N. H	74	Minn	8
Vermont	6	N. D	8
Mass	62	S. D	12
R. I	5	Nebr	39
Conn	14	Kans	107
N. Y	209	Okla	3
Penn	143	Texas	73
N. J	123	N. Mex	41
Del	1	Ariz	70
Md	46	Colo	268
D. C	65	Wyo	7
Va	17	Mont	7
N. C	112	Utah	61
S. C	121	Idaho	3
Ga	40	Nevada	8
Fla	128	Oregon	11
Ohio	89	Wash	21
W. Va	2	Calif	178
Kentucky	15	Mexico	15
Tenn	242	Quebec	94
Ala	12	Ontario	121
Miss	40	Alaska	11
Ind	11	Manitoba	6
Ill	63	Vanc. Isd	19
Wisc	208	Brit. Col	43
Mich	43	Greenland	1
Iowa	161	Nova Scotia	4
Mo	155	Newfoundland	1
Ark	9		

From the figures presented above, the most striking fact that will be apparent is not the number of species found in any one region, but the meagre information that we have concerning the Cicadellid fauna of the majority of the states and provinces. The value of state and even local lists is here quite apparent, through the service that they render in extending the known distribution of species.

It is quite evident that certain sections accommodate a considerably larger number of species of Cicadellidæ than others whose climatic conditions are less varied, but it may be estimated that nearly all of the states should give from 150 to over 250 species. Considering the meagre collecting that appears to have been done in certain parts of our territory the total number of living species of this group will undoubtedly be found to be greatly in excess of one thousand.

A NEW LEAF-CUTTING BEE FROM THE HAWAIIAN ISLANDS.

BY T. D. A. COCKERELL,
Boulder, Colorado.

Some time ago Mr. P. H. Timberlake requested me to examine the status of a *megachile* now common at Honolulu, but considered to have been introduced from some place not determined. It was very much like *M. palmarum* Perkins, also common in the Hawaiian Islands, but evidently distinct. A few days ago he sent me a long series of this bee, and after prolonged study and comparisons, I can only regard it as undescribed. It belongs to the subgenus *Eutricharæa* Thomson (*Paramegachile* Friese), and is very much like the European *M. argentata* Fabr.* Bees of this type are very widely distributed over the world, so I confidently expected to locate the Hawaiian insect in Japan, China, the Phillipines, Australia, or elsewhere. It is very like *M. crimæ* Mosc., from New Guinea, but has dusky wings. Superficially, it might be taken for any one of about a dozen species, but it agrees with none. It may have come from one of the other Pacific islands, as Samoa or Tohitic, and it is perhaps significant that a Tahihan *Lithurgus* has been introduced into Oahu. It is a fact, however, that endemic species of this group of *megachile* occur in very remote places, and there is no apparent reason why they should not exist in the Hawaiian Islands. *M. palmarum* is said by Perkins to occur probably in all the islands, and it is quite possible that the new species has existed on one of the islands, though perhaps more recently brought to Oahu.

Megachile timberlakei, n. sp.

Male (Type).—Length 8–8.5 mm.; black, parallel-sided, with large head, simple antennæ, spined anterior coxæ and simple anterior tarsi. Face and front densely covered with light yellow to creamy-white hair; mandibles black, hairy at base; antennæ slender, black; vertex with long dark fuscous hair; cheeks above with light yellowish hair, but below it is long and pure white; hair on thorax above and upper part of sides ochreous, varying to paler, beneath pure white; mesothorax and scutellum dull and very finely punctured; a band of tomentum along hind margin of scutellum; tegulæ black; wings dusky with black nervures; legs black, with white hair, yellowish on inner side of basitarsi first four abdominal segments with pale yellowish hair-bands, and narrow curved bands in the depressions; upper surface of sixth segment densely covered with white tomentum; apical keel emarginate, with irregular denticles on each side; fifth ventral segment and anterior femora in front more or less pallid, brownish.

Female.—Length 10–10.5 mm.; supraclypeal area and middle of clypeus exposed; much dark fuscous hair on mesothorax and scutellum; ventral scopa pure white, black on last segment.

Type male, Kaimulai, Oahu (*Timberlake*). Also from Honolulu and Makua, Oahu.

Compared with *M. palmarum* received from Dr. Perkins, the male differs by the denticulate and less deeply emarginate keel of sixth abdominal segment, the more oblique sub-basal bands of abdomen, and the fulvous or subochraceous

*In Friese's Die Bienen Europa's there is a curious error in the key, in which the scopa of *M. argentata* is said to be entirely white. It is black on the last segment, as is correctly stated in Friese's description.

tint of the hair on thorax above, with a distinct band behind scutellum and a fainter one in front. The hind tibiæ of *palmarum* are larger and more robust, and much less densely white—hairy. In the female, the pure white ventral scope, black on last segment, is distinctive. A *palmarum* received from Dr. Perkins has the scopa pale reddish, black on last segment; one from Mr. Timberlake has it creamy-white, black on last segment and sides of penultimate. In his description, Perkins states that the hair of the female is cinereous, with little or no fulvous tinge, and is sparse on clypeus. This agrees with *palmarum* as here recognized, but his account of the ventral scopa is more suggestive of *timberlakei*. Possibly he had the two females mixed, but his type must be considered to be the male, which is described at length. The clypeus in *timberlakei* has a large and dense brush of inwardly-directed hairs on each side, but there is little of this in *palmarum*.

A PLEA FOR DEFINITIVENESS.

I should like to bring to the attention of contributors to the Canadian Entomologist a matter which is worthy of consideration, especially to the systematist. In looking over many numbers of the "Entomologist" I have noted numerous headings such as "A Canadian Trigonalys." The point which I would like to bring out is that, to the student who is not familiar with the family to which the genus Trigonalys belongs, nothing is conveyed: that is, he is utterly "at sea" as to the family discussed. Would not the interest in these various genera and families be greatly increased if authors were to give not only the genus and family, but also the name of the superfamily and order under discussion. A great service would be rendered students taking up a family for study if they could quickly locate all the literature on a family, and a great many synonymous names might be avoided. After all, it must be remembered that the aim of every author is to place his findings in such a position that they will be readily available to others, and his work is judged largely by his ability to do this. The above example was selected at random, and it happens that it is but a mild example of hundreds of cases. A specialist should bear in mind that everyone is not up-to-date in his particular field, but a great deal more interest would be taken if greater definition were given.

C. Howard Curran.

Mailed May 25th, 1920.

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POPULAR AND PRACTICAL ENTOMOLOGY.

FRAGMENTS IN THE LIFE-HABITS OF MANITOBA INSECTS—II.

BY NORMAN CRIDDLE,
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In a Province such as Manitoba, which is comparatively new agriculturally, we are continually experiencing insect outbreaks involving species not hitherto known to be obnoxious. The insects concerned are always native to the country and frequently owe their increase to the development of agriculture, which has been the means of placing new food supplies at their disposal. In other instances the insects have doubtless multiplied abnormally in the past but owing to the lack of observers at such times, their abundance apparently did not attract attention. Two such outbreaks have occurred in Manitoba within the last few years and though my notes relating to them are by no means complete they seem, however, sufficient to indicate the general habits of the insects concerned, and have, therefore, been brought together for publication under the above heading.

THE BROME-GRASS CUTWORM.

(*Trachea fanitima cerivana* Smith).

The larvæ of this insect are unobstrusive in their general habits and might pass unnoticed were it not for the fact that they gather in the sheaves of Brome-grass (*B. enermis*) to hide. The caterpillars are naturally shaken out of these sheaves at harvest time and in consequence attract attention as they crawl about the bottoms of the racks when the grass is being threshed.

The Brome-grass Cutworm is a surface feeder which hides under, or in, any convenient object, such as hay, etc., during the day and comes out to feed at night. It attacks the young shoots, or tender leaves, of various succulent grasses but shows a marked preference for brome-grass. The larvæ first attract attention about the middle of September when they gather into the grass sheaves which have been cut for seed purposes. Apparently the insects enter the sheaves with the object of securing shelter rather than for hibernating purposes, as they still continue to feed at night, though not very extensively. By the middle of October the caterpillars have attained a similar size and have finished feeding for the year. At this date, most of them leave the sheaves that are standing upright but they may still be found beneath those lying down or under any other conveniently placed object. They are now often partly buried in the soil showing that the time of hibernation has arrived.

In the spring, larvæ still remain in the vicinity of their hiding places and appear to eat comparatively little. They are, however, active by the time farming operations commence and continue to feed until they pupate in early May. A description of the caterpillars as they are met with in autumn follows :

Length 26 mm. Head light brown notably reticulated with darker brown; on either side of the median suture is a rather wide dark brown irregular band extending from the vertex to near tip of clypeus the latter being margined with the same shade of colour; ocelli and mandibles black. Body, ground colour dull pinkish-white, closely marbled above with blackish-brown, giving the whole body a dark appearance; dorsal stripe narrow, pinkish-white, distinct on all segments; lateral stripe similar to dorsal one but less distinct. Stigmatal band pale, rather ill defined: spiracles yellowish, black rimmed. Thoracic shield brown divided by dorsal and lateral stripes. Tubercles indistinctly blackish, I, II, III and IV of similar size, IV immediately behind the centre of spiracle on segment six, tubercle V smaller than IV close to spiracle and in a line with its upper side; the other tubercles similar in size to III. Anal plate pinkish-brown. Thoracic feet yellowish-brown; prolegs concolorous with venter; crotches reddish.

Moths commenced to emerge in captivity on June 5 and the last to appear in my cages was on June 7. Outside, they have been collected from the beginning to the end of that month but were commonest during the first two weeks. The moths are of the usual cutworm size with pale gray primaries showing a brownish area on the middle portion; the head and thorax are also gray while the abdomen and secondaries are dull brown.

The economic importance of the Brome-grass Cutworm lies chiefly in its relation to the production of the grass upon which it feeds. Observation, combined with reports from threshermen in various parts of the province, show that the insect occurs in large numbers over a wide area. The moths have also been taken in Saskatchewan and Alberta. It is, therefore, probable that the larvæ will be found to occur in equal numbers on the brome-grass fields of Saskatchewan and perhaps in Alberta also. In Manitoba the insects are usually so abundant in the sheaves at threshing time that they cause considerable annoyance by getting into the seed while the racks frequently present a mass of crawling caterpillars. When one views a field of brome-grass inhabited by these insects, however, the actual damage done to the plants appears to be remarkably small considering the number of larvæ present. This is probably due to the vigorous growth of the grass after harvest which thus largely overcomes the insect's attack upon it. The species is not, therefore, a serious menace at the present time though the damage it does is probably much in excess of the usual estimates. Should it increase to still greater numbers, however, the loss would have an important bearing on the pasture situation of the west, brome-grass being recognized as one of the most valuable fodder plants of that region.

We know of no actual means of suppressing this pest but the following suggestions might be of advantage in attempting its control:

(1) Plough affected fields in July and cultivate them later on to prevent further growth; thus starving the young caterpillars.

(2) Destroy the insects shaken into the racks.

(3) Feed brome-grass straw and burn the refuse around where the crop has been threshed. This will kill a large number of the cutworms which drop to the ground while the sheaves are being handled and which hibernate in the vicinity amid the chaff, etc., scattered round by the thrashing operations.

The Early Aspen-Leaf Curler.

(*Proteopteryx oregonana* Wlshm.)

The years 1917-18 were noteworthy, in an entomological sense, owing to the abundance of three microlepidopterous leaf-curling larvae all of which attacked aspen poplar, *Populus tremuloides*. One of these insects has already been dealt with,* while the habits of a second are described below.

The larval habits of the Early Aspen-leaf Curler are similar in many respects to those of other leaf-curling species but unlike the other two prevalent during the period mentioned above, complete their life the same season that they hatch from eggs, instead of hibernating, while the moths differ by emerging from over-wintering pupae very early in the spring. In 1918, they were on the wing in millions by the end of March.

The moths are of a dull blackish-brown colour above, indistinctly barred with darker tints, the secondaries being lighter. They may be met with at any time during the day when they rise from the leaves as one walks through the woods. Usually, however, the time of greatest activity is towards evening, approximately an hour before sunset until dark. It is then that they rise in large swarms and fly backward and forward over the tops of the trees. This is when the air is still. A very light breeze, however, is sufficient to force them downward. It is due to the wind that they gather in the shelter of the woods and drop sufficiently close to the ground to be watched with ease. Observed under such circumstances they were seen to fly around the lower trees in a similar manner to their movement about the higher ones but in addition to the general habits on the wing they were also found to possess another one which consisted of alighting upon a twig a foot or more from its extremity and then running to the top where they would remain stationary for a few moments as if attempting to secure nourishment from the bud, after which they would arise again to join the flying swarm. The moths continued in their evening activities, whenever the atmosphere was sufficiently warm, for more than a week before oviposition commenced and remained in large congregations throughout most of the egg-laying period.

The eggs are flat, scale-like objects, of a dark clay-yellow and thus resemble very closely certain marks always present upon the twigs. They are usually deposited singly but occasionally three or more may be found slightly overlapping each other. In 1918, eggs were deposited from April 6 to approximately the 20th. They are always found upon the smaller twigs and there seems to be some attempt made to place them around the scars or buds where they are less detected. With calm weather most of the eggs are laid on the higher trees but otherwise they may be found comparatively close to the ground on quite small trees, or near the tips of the lower branches of larger ones. It is due to these habits that certain clumps of trees may be almost entirely defoliated later on, while others in the same neighborhood escape with comparatively small injury.

Larvae usually begin to emerge towards the end of April and are numerous a few days later. When they first appear the caterpillars are somewhat flattened objects with a head exceeding the body in width. They are dull yellowish in colour, with a black head and dark but duller thoracic shield. The larvae become of normal cylindrical shape after moulting and change very little in colour

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throughout their further stages. When mature they may be briefly described as follows:

Length about 14 mm.; body dull white; head shining black; thoracic shield widely margined on sides and narrowly posteriorly with black; thoracic legs dull black; prolegs whitish. Tubercles large, flat, but difficult to define on account of the pale colour.

In 1918 the trees were still without leaves at the time the larvæ commenced to appear though here and there, odd buds had burst sufficiently to enable the young caterpillars to obtain a certain amount of food, a majority, however, being obliged to remain without it for some days longer. The spring of 1918, however, had been an abnormally early one and in consequence, induced an early hatching of the larvæ besides causing the leaves to appear before their usual time. Thus the larvæ had already commenced to curl the leaves when the weather suddenly changed from extreme heat to severe cold the effect being to kill the latter and in consequence entirely cut off the insects' food supply. The result was naturally disastrous to the caterpillars and caused a great many to die of starvation. It is possible that the mortality may have been due to cold also, but from the fact that large numbers of larvæ were observed crawling about in search of food afterwards, the evidence indicates that lack of it was the principal cause of death. The threatened devastation of the poplar leaves in 1918 was thus reduced, by the meteorological condition alone, to comparative insignificance though sufficient larvæ survived to provide various local outbreaks the following year.

In 1919, larvæ appeared soon after the poplars began to leaf out and by May 12 had curled 50 per cent. of the leaves on certain clumps of trees. The insects developed very quickly. By May 27 many had become fully mature and were dropping from the trees in large numbers. To observe the falling of the caterpillars when they are about to pupate, is a very interesting incident; the larvæ apparently prepare themselves for the drop by crawling to the edge of their shelter and fastening themselves firmly to the leaf by means of a silken thread. Here they remain until a breeze sweeps through the trees when the shaking causes them to loosen their hold and they come down in a regular shower, the web affording just enough check to prevent a direct fall. As the insects reach the dead herbage the rattle sounds not unlike that of a sudden shower of rain but so quickly the larvæ wriggle out of sight that unless careful watch is kept they are apt to entirely escape detection. These showers of caterpillars may continue intermittently for several hours there being an absolute lull in activity between the gusts of wind, though there is little doubt that they would let themselves down in any case should the weather remain calm. The larvæ at the time they drop, are quite devoid of internal colour matter such as that provided by food, and present a dull white appearance with a brownish head and a small patch of the same colour on the front portion of the sides of the thoracic shield.

Pupation takes place below the dead leaves usually a short distance in the soil. The pupal stage lasts from early June until the following spring, or approximately 10 months.

The parasitic enemies of the Early Aspen-leaf Curler are numerous but have not been studied. Of the predacious enemies there are a number. One large beetle, *Calosoma frigidum*, was met with everywhere and was observed to be active both by day and night. Running briskly up the trees or flying from branch to branch, it searched diligently for the leaf-curlers which it devoured with evident relish. Its larva is not a climber but is equally useful as it is able to seek out and devour the pupæ which are buried below the dead leaves. The increase of this Calosoma beetle has been very marked during the outbreak of leaf-curlers doubtless due to the abundance of caterpillars upon which it feeds.

Several birds have been observed to eat the leaf-curlers; these embrace the Rose-breasted Grossbeak, Red-eyed Vireo and Cedar Bird but the time of their activity in this regard is short owing to the fact that the caterpillars season has ended before many of the birds commence to nest. It is, therefore, those species which are passing through during migration that we can look to as being of most use as destroyers of the Early Aspen-leaf Curler.

A NEW TORTRICID MOTH FROM NOVA SCOTIA, (LEPIDOPTERA).

BY AUGUST BUSCK,
Washington, D. C.

Cacœcia hewittana, new species.

Labial palpi, face and head light reddish ochreous. Thorax light brown. The ground colour of the fore wings varies in different specimens from light ochreous, often with a reddish tint, to dark brown, and is faintly reticulated with thin dark brown transverse lines; a dark-brown, outwardly oblique, transverse fascia from before the middle of costa to just before tornus is normally attenuated on the upper part of the cell and broadens out towards the dorsal edge; a large dark brown triangular costal spot at apical third is sometimes more or less connected with the fascia; extreme apex and upper part of termen blackish brown; the males with a narrow costal fold from base to apical third. Hind wings dark fuscous with apex golden ochreous, cilia golden ochreous with a dark fuscous basal line parallel to the edge of the wing. Undersides of both fore and hind wings light fuscous with the costal termen edges broadly golden ochreous. Abdomen dark fuscous with ochreous underside and anal tuft. Legs golden ochreous.

Alar expanse: 16-20 mm.

Habitat: Sydney, Nova Scotia, Canada.

Type and paratypes in National Collection of Insects, Ottawa, Canada, and in the United States National Museum, (Type No. 22667).

Described at the request of Mr. Arthur Gibson, from a large series which he bred from raspberry received from Mrs. S. J. Harrington.

Named in honour of the late Dr. C. Gordon Hewitt.

Species is typical of the genus and nearest to *Cacoecia fractivittana* Clemens but smaller, (especialy the females, there being no striking dissimilarity in the sexes as in Clemens species) and darker in colour. The male genitalia are typical for the genus, with well developed spoon-shaped uncus, hook-like gnathus, absence of socii, well-defined unarmed transtilla and short broad harps. The tegumen is noticeably narrower, the top of the harps more pointed and the aedoeagus more pointed than in *Cacoecia fractivittana* Clemens.

SOME NEW NORTH AMERICAN SAPROMYZIDÆ (DIPTERA).

BY J. R. MALLOCH,
Urbana, Ill.

Some of the species described herein have been in my possession for some years, while others were recently submitted for identification by Mr. W. L. McAtee, in connection with the preparation of a paper on the species occurring in the vicinity of Washington, D.C., and by Mr. C. W. Johnson. The location of the type specimens is stated in the paper.

Minettia punctifer, sp. n.

Female.—Testaceous yellow, shining, thoracic dorsum densely yellowish pruinescent. Antennæ and palpi yellow; frons opaque, paler on orbital stripes and ocellar triangle than on interfrontalia; ocellar spot black. Thoracic dorsum with a pale brown dot at base of each hair and bristle. Abdomen with a black spot in centre of each tergite from 2 to 5 inclusive and a smaller spot on each side of the apical two or three tergites. Legs pale. Wings clear.

Frons a little longer than wide, with two strong backwardly directed orbital bristles on each side; arista with very short hairs; parafacial and cheek very narrow. Thorax with three pairs of dorsocentrals, one pair of strong prescutellar acrostichals, and a moderately strong intra-alar bristle. Hind femur and hind tibia without preapical bristle. Last section of fourth vein about 1.75 as long as preceding section.

Length 2 mm.

Type.—Fort Lauderdale, Fla., February 18, 1919, (A. Wetmore). Type in collection of U. S. Bureau of Biological Survey.

Sapromyza nubilifera, sp. n.

Male and Female.—Testaceous yellow, shining. Both cross-veins broadly infuscated.

Similar in all respects to *nubila* Melander in cephalic and thoracic details, differing in the male only as follows: Apical sternite with a series of short black setulæ on apical margin, which are absent in *nubila;* hind tibia and hind metatarsus with long, fine hairs on anterior surface, which are absent in *nubila;* Hind femur in both sexes without fine hairs on antero- and postero-ventral surfaces, the latter especially lacking these, which are present in *nubila*.

Length 3.5–4.5 mm.

Type.—Male, and one male paratype, Monticello, Ill., June 21, 1914. Allotype, Monticello, Ill., June 28, 1914. Paratypes, two males, Mahomet, Ill., August 6, 1914; two males and two females, Urbana, Ill., June 17, 1916; one male and one female, same locality, June 20, 1915; one male and one female, same locality, June 23, 1916 (Hart and Malloch).

Type in collection of Illinois Natural History Survey.

Sapromyza fuscibasis, sp. n.

Male and Female.—Yellow testaceous, shining. Each wing with 6 brown spots as follows: on each cross-vein, at apices of veins 2, 3 and 4, and on last section of 3 beyond cross-vein; base of third vein dark brown. All hairs and bristles black.

Arista short-haired above and below; lateral facial hairs weak; ocellar and postvertical bristles strong. Thorax with 3 pairs of strong dorsocentrals and very strong acrostichals, of which two pairs are proximad of the anterior pair of dorsocentrals. Abdomen in male stout; eighth tergite with two curved downwardly projecting processes at apex of each lateral extension, one of them with numerous microscopic black points on apical half. Hind femora with or without a weak preapical antero-ventral bristle; hind tibia in male normal.

Length 3.75–4.25 mm.

Type.—Male and two male paratypes, White Heath, Ill., July 11, 1915, (J. R. Malloch). Allotype, and one male and two female paratypes, Summer, Ill., August 2, 1914, (C. A. Hart). Paratypes, one female, St. Joseph, Ill., June 27, 1915; one male, Dubois, Ill., August 8, 1917, (J. R. Malloch); one male, Urbana, Ill., September 15, 1891, (J. Marten); two females, Plummer's Island, Md., June 28, 1914, and September 13, 1914, (W. L. McAtee).

Type in collection of Illinois Natural History Survey.

Sapromyza (Sapromyzosoma) citreifrons, sp. n.

Male.—Pale yellowish testaceous, almost stramineous, the frons, and at times the entire head lemon yellow. Wings marked as in *fuscibasis*, but the spot at apex of second vein is almost indistinguishable, and the base of third vein is pale. Bristles on dorsum of head, thorax, and abdomen brown, the hairs and bristles on sides of head and thorax and on legs yellow.

Head very large, the frons slightly swollen, parafacial in profile wider than third antennal segment; arista with short hairs; cheek about half as high as eye, the marginal hairs long, curled. Thorax with 4 pairs of dorsocentrals which decrease very much in size anteriorly; acrostichals small but distinct, about 6 pairs, not carried proximad of the anterior dorsocentrals. Abdomen short, constricted at apex, when the hypopygium is concealed the basal portion, eighth tergite, appears spherical; lateral extension of eighth tergite with a short, broad, apically rounded terminal process. Bristles on fore coxæ and postero-ventral surface of fore femora remarkably long and slender; mid femur with a very long slender bristle at base on ventral surface; hind tibia normal.

Length 2.5–3 mm.

Type.—Savanna, Ill., June 13, 1917. Paratypes, Cobden, Ill., May 9, 1918, (J. R. Malloch). Five males.

Sapromyza occidentalis, sp. n.

Male and Female.—Similar to *fraterna* Loew and *notata* Fallen in colour, the entire body being yellowish testaceous including the legs, and each wing with 7 brown spots.

Differs from the above two species in having the thorax with 4 pairs of dorsocentral bristles, the acrostichals much weaker and regular in size, and the hind femur without a preapical antero-ventral bristle. The hypopygium of the male differs in structure from that of *fraterna*.

Length 3.5–4 mm.

Type.—Male, and allotype and five male paratypes Pasadena, Cal. (coll. Aldrich). One male paratype, Laguna Beach, southern California, (Baker).

Type in collection of Dr. Aldrich.

Sapromyza pernotata, sp. n.

Male.—Similar to *fraterna* in colour and markings.

Differs in structure of the male hypopygium from *fraterna*, the thoracic chaetotaxy being the same. The eighth tergite has the lateral extension with a short process the apex of which is produced in the form of a slightly forwardly directed sharp thorn at its anterior angle, while in *fraterna* this tergite has a broader process which has a backwardly directed, curved sharp thorn at apex anteriorly. The small furcate process mesad of the above process is differently shaped in the two species. In *fraterna* there are two subequal thorns, while in *pernotata* on is much larger than the other.

Length 4 mm.

Type and one male paratype.—Cedar Lake, Ill., August 4, 1906, in a tamarack bog.

Type in collection of Illinois State Natural History Survey.

Sapromyza imitatrix, sp. n.

This and the next species belong to the same group as *bispina* Loew, which contains species with the following characters: Entire body and legs yellowish testaceous, wings unmarked, the cross-veins usually darker than the others, but the adjoining membrane not infuscated; arista with short hairs; thorax with 4 pairs of strong dorsocentrals and well-developed acrostichals; hind tibia of male with soft erect hairs on antero- or postero-ventral surface or on both; and the apical abdominal sternite with two long slender processes.

Male.—Differs from *bispina* in having the processes of apical sternite almost uniform in width, rounded at apices; the hind femur with long, fine hairs on entire length of both antero- and postero-ventral surfaces, and the hind tibia with long, fine hairs from base to well beyond middle on postero-ventral surface, while the antero-ventral surface is bare.

Female.—Differs from *bispina* in having the prosternum bare, and the hind femur with a long setulose hair near apex on postero-ventral surface.

Length 4–4.5 mm.

Type.—Male, and one male paratype, Clementon, N. J., May 30, 1895. Allotype, Anglesea, N. J., July 19, 1891. Paratypes, one male, Riverton, N. J., July 7; one female, DaCosta, N. J., June 4, (C. W. Johnson).

Type in collection of C. W. Johnson.

Sapromyza fratercula, sp. n.

Male.—Differs from *imitatrix* in having the hind femur with very few sparse hairs on postero-ventral surface, and those on antero-ventral longer and stronger on apical half and almost absent on basal; the hind tibia with fewer hairs on postero-ventral surface and some at base on antero-ventral; the eighth tergite with a slight ridge on lateral extension posteriorly; and the small, median thorn at base of the large, slender forwardly directed hypopygial process furcate instead of simple.

Length 5 mm.

Type and two male paratypes, Powderville, Mont., June 15, 1916, (R. Kellogg and M. Hanna). Type in collection of U. S. Bureau of Biological Survey.

SOME NEW SPECIES OF LONCHÆIDÆ FROM AMERICA (DIPTERA).

BY J. R. MALLOCH,
Urbana, Ill.

The species described in this paper belong to the genus Lonchæa which contains a large number of forms which superficially resemble each other very closely, but which upon examination are easily separated in most cases by means of characters usually ignored by systematists. In the descriptions here presented I have introduced some of the most useful of those characters, and as I have in preparation a key to the species occurring in America and Canada, I have not made a lengthy comparison of allied forms in this paper, depending upon the publication of the key to make the relations clear.

Lonchæa aterrima, sp. n.

Male.—Glossy black, without any evident bluish tinge. Frons opaque black, upper orbits shining, subgranulose, not glossy; antennæ black. Wings slightly brownish, veins brown. Calyptræ brownish, fringes fuscous. Legs black, basal two or three tarsal segments yellowish. Halteres black.

Eyes bare; frons at vertex a little less than one-fifth of the head-width, narrower anteriorly; marginal and interfrontal hairs long, the latter in two series; frontal lunule bare; third antennal segment about 1.5 as long as wide; second segment of arista nearly twice as long as thick; hairs on cheek long, not dense. Thoracic bristles not very strong, those on scutellum not much more conspicuous than the numerous marginal hairs; two or three hairs at base of stigmatal bristle; pteropleura bare. Hind femur without any outstanding antero-ventral bristle near apex; hind tarsus with the basal segment slightly incrassated.

Female.—Frons broader than in male, at vertex one-third of the head-width, the interfrontalia with the hairs more irregularly arranged and more numerous; third antennal segment broader than in male. Ovipositor very distinctly broader than in any other described American species, acute at apex, the apical hairs very short.

Length 3.5–4 mm., exclusive of ovipositor.

Type, male, and allotype, Orono, Me., May 19, 1912, (H. M. Parshley). Paratypes, two females, Mt. Washington, N. H., July 4 and 6, 1914, alpine garden, and 2,500 feet altitude (C. W. Johnson). Type and allotype collection of Boston Society of Natural History.

This species belongs to the subgenus Earomyia.

Lonchæa hirta, sp. n.

Male.—Glossy black, thoracic dorsum with faint violet and blue reflections, abdomen distinctly bluish. Tarsi yellowish testaceous, apical two and part of third segment fuscous. Wings whitish, distinctly infuscated at bases, veins very pale, darkened at apices. Calyptræ brown, fringes fuscous. Halteres black.

Eyes with sparse, almost indistinguishable short hairs; frons at vertex about one-fourth of the head-width, narrowed anteriorly, with numerous long erect hairs, some hairs caudad of the orbital bristle; third antennal segment at least three times as long as its greatest width; cheek with dense, erect, stiff black hairs of a uniform length. Dorsum of thorax with longer and more dense hairs

than in other species; scutellum with numerous hairs on apical half of disc; several hairs at base of stigmatal bristle; pteropleura with one or two long hairs in centre. Abdomen more densely haired than in other species. Inner cross-vein below apex of auxiliary; last section of fourth vein distinctly sinuous. Hairs on posterior surface of mid and fore femora long and rather dense; hind femur with a series of fine hairs on antero-ventral surface but no bristles.

Length 4.5–5 mm.

Type.—Briggsville, North Adams, Mass., June 18, 1906. Paratypes, same locality as type, June 19, and North Adams, Mass., June 18 (C. W. Johnson). Three males. Type in collection of Boston Society of Natural History.

Lonchæa affinis, sp. n.

Male.—Similar to *hirta* in colour, the wings yellowish, with pale bases. Frons not so densely haired, the cheeks especially more sparsely haired: third antennal segment barely three times as long as its greatest width. Thorax and abdomen less densely haired than in *hirta;* pteropleura bare. Venation as in *hirta*, the last section of fourth vein not so noticeably sinuous.

Female.—Similar to the male in colour.

Eyes separated by about one-third of the head-width at vertex, slightly less anteriorly; frons shining, minutely granulose, with a slight carina in centre as in male; sometimes one or two hairs present caudad of the orbital bristle. Ovipositor with two exceptionally long hairs on upper side near apex. Inner cross-vein beyond apex of aulixiary vein.

Length 4–5 mm.

Type.—Male, Mt. Washington, N. H., Alpine Garden, July 4, 1914. Allotype, Glen House, N. H., June 13, 1916. Paratypes, male, Mt. Everest, Mass., June 27, male, North Adams, Mass., June 15; male, Bashbish Falls, Mass., June 28, 1912; female, South West Harbor, Me., July 13, 1918 (C. W. Johnson). Type in collection of Boston Society of Natural History.

Lonchæa ruficornis, sp. n.

Female.—Black, shining; thorax slightly, abdomen distinctly bluish. Antennæ rufous orange, third segment narrowly brownish on upper margin and apex. Wings clear, veins yellow. Legs black, tarsi yellowish testaceous, slightly infuscated on apical segment. Calyptræ white, fringes concolorous. Halteres black, stems yellowish.

Frons a little over one-third of the head-width, shining, but not glossy, the surface except the upper part of orbits with microscopic diagonal striæ; ocellar triangle glossy; anterior ocellus not caudad of orbital bristles; frontal hairs strong and numerous, absent from a large subtriangular area in front of ocelli; parafacials and cheeks microscopically diagonally striate, the cheeks with dense stiff uniform black hairs; third antennal segment about three times as long as broad. Thorax with short decumbent hairs, the bristles not long; several hairs at base of stigmatal bristle; pteropleura bare. Ovipositor stout, the preapical dorsal hairs short. Legs normal. Second costal division about one-eighth as long as first; last sections of veins 3 and 4 parallel.

Length 5 mm.

Type.—Savanna, Ill., June 14, 1917, (J. R. Malloch). Type in collection Illinois Natural History Survey.

Lonchæa angustitarsis, sp. n.

Female.— Black, glossy, with very faint bluish reflections. Frons shining, upper orbits and ocellar triangle glossy; antennæ black. Legs entirely black. Wings clear. Calyptræ brown, fringes fuscous. Halteres black.

Frons a little less than one-third of the head-width, microscopically granulose, with sparse hairs on the interfrontalia; orbital bristle proximad of the anterior ocellus; lunule with some hairs; third antennal segment about 2.5 as long as broad; cheek with moderately long, sparse setulose hairs; palpi not much broadened. Thoracic bristles much longer and stronger than the hairs; some hairs on margin of scutellum between the bristles; stigmatal bristle simple. Legs slender, the tarsi much more so than in allied species; hind femora without antero-ventral preapical bristle. Veins 3 and 4 parallel apically.

Length 3 mm.

Type.—Echo Lake, Mt. Desert Me., July 12, 1918, (C. W. Johnson). Type in collection of Boston Society of Natural History.

Lonchæa nigrociliata, sp. n.

Female.—Differs from the preceding species in having the tarsi yellowish testaceous, with the apical one or two segments fuscous, and the wings yellowish.

Frons slightly broader than in *angustitarsis*, subopaque, and with more numerous interfrontal hairs; frontal lunule bare; third antennal segment broad, its length about twice as great as its breadth; cheek as in preceding species. Legs stouter than in that species, the hind tarsi slightly thickened; hind femur without preapical antero-ventral bristle. Second costal division much shorter than in *angustitarsis*, the inner cross-vein but little beyond apex of auxiliary whereas in the other species it is almost below apex of first vein.

Length 3.5 mm.

Type.—South West Harbour, Me., July 11, 1918, (C. W. Johnson).

Lonchæa aberrans, sp. n.

Male and Female.—Similar in colour to *nigrociliata*.

Frons of male with two series of long hairs on centre of interfrontalia, of female with a few hairs in addition to the two series; frontal lunule bare; third antennal segment but little longer than broad, about 1.5 at most; cheek as in *nigrociliata*. Upper part of orbits microscopically diagonally striate, with a silky appearance which is quite different from the broader glossy orbits of *nigrociliata*. Thorax as in that species but usually there are no hairs between the apical scutellar bristles. Legs as in *nigrociliata*. Second costal division shorter than in that species, the inner cross-vein almost below apex of first. Ovipositor very slender, the apical hairs very short.

Length 3–3.5 mm.

Type.—Female, Parker, Ill., April 17, 1914, (Hart and Malloch). Allotype, Algonquin, Ill., May 4, 1895, (Nason). Paratypes, male, Carlinville, Ill., determined as *polita* Say by Williston, (C. Robertson); female, Spruce Brook, Newfoundland, August 8–12 (Amer. Mus. Nat. Hist.); one male and one female, reared from heads of bull thistle, Elphinstone, Man., collected July 27, 1906, emerged in laboratory February 25 1907, (W. A. Burman). Type in collection of Illinois State Natural History Survey.

This and the preceding species belong to the subgenus Earomyia.

Lonchæa pleuriseta, sp. n.

Male and Female.—Glossy black, without a pronounced blue tinge. Orbits above, and upper half of frons shining, lower part of latter becoming whitish tomentose and densely so at anterior margin; face, parafacials, and cheeks densely white tomentose; antennæ and palpi black. Legs black, tarsi more or less broadly reddish yellow at bases. Wings clear, veins brown, paler basally. Calyptræ gray, fringes black. Halteres black.

Eyes densely hairy, the hairs on male much longer than those no female; third antennal segment about twice as long as wide, its apex almost at mouth-margin; cheek from margin of mouth to lower margin of eye wider than third antennal segment, with rather dense, erect, fine hairs; frons of male about twice as long as width at vertex, narrowed a little anteriorly, the surface with rather long hairs, some hairs above orbital bristle; frons of female about one-third of the head-width, the hairs as in male but shorter; dorsum of thorax with rather dense hairs; scutellum with numerous hairs on disc and some long setulose hairs on margin, which are almost as long as the marginal bristles; pteropleura with some setulose hairs in centre. Second costal division over half as long as first; inner cross-vein well in front of apex of first vein; veins 3 and 4 subparallel.

Length 4–5 mm.

Type.—Male, allotype, and 11 paratypes, Fort Snelling, Minn., April 28, 1920, (R. N. Chapman). Reared from puparia found under bark of dead oak tree, April 21, 1920. Type in collection of University of Minnesota.

Lonchæa ursina, sp. n.

Male.—Differs from the preceding species in having the frons narrower and with longer hairs, the third antennal segment narrowed at apex, the cheeks narrower and with more sparse, longer setulose hairs, thoracic dorsum with longer and denser hairs, pteropleura bare.

Length 4–5 mm.

Type and one paratype.—Naknek Lake, Alaska, (J. S. Hine). Type in collection of Professor Hine.

A NEW SPECIES OF THE GENUS PISSODES (COLEOPTERA).

BY RALPH HOPPING,
Division of Forest Insects, Dominion Entomological Branch.

Up to the present time only four species of Pissodes have been recognized from California.* Two of these are coast species, *Pissodes barberi* Hopk. and *P. radiatæ* Hopk. The former from Humboldt County probably breeds on the Sitka spruce, the latter is known to breed on the Monterey pine and Knobcone pine. The remaining two are found in the high mountains of the State. One, *Pissodes californicus* Hopk., breeding on the western yellow pine (*Pinus ponderosa* Laws.), and the other, *Pissodes yosemite* Hopk., breeding on *Pinus ponderosa* Laws., *Pinus lambertiana* Dougl. and *Pinus monticola* Don.

None of the California species mentioned above have been found breeding on the lodgepole pine (*Pinus contorta* Dougl.). The only species mentioned as breeding on lodgepole pine in Dr. Hopkins' monograph of the genus are *Pissodes*

*Contributions toward a monograph of the Bark-Weevils of the genus Pissodes, by A. D. Hopkins, Tech. Series, No. 20, Pt. 1, U. S. Dept. Agr, Nov. 11, 1911.

webbi Hopk. from Arizona and New Mexico and *Pissodes murrayanæ* Hopk. from Oregon.

The work of *Pissodes* in California has been observed by the writer to consist of two distinct methods of attack either on the stem just above and below the ground, as in the attacks of *P. yosemite*, or in the terminals of the stem and limbs, as in *Pissodes terminalis*, sp. nov., described below. It is very doubtful whether any Californian species employs both methods of attack. At present *P. terminalis* seems to be the only Californian species attacking the terminals.

Pissodes terminalis, sp. nov.

The general colour is yellow-brown. The elytral interspaces three and five are broader than two and four and distinctly elevated, especially interspace three. The striæ have deep, irregularly spaced punctures which are often obliterated by the scales. The elytra have yellow-scaled anterior spots and a more or less fused posterior band of white and yellow scales near the vertex of the declivity, the white scales extending to the *sutural median line and covering the first and second interspaces to the scutellum.* The apices of the elytra are covered with yellow scales. The white scales also extend across the median portion of the femora of both the middle and posterior pair of legs. The pronotum is densely covered with scales, those on the marginal half forming a white band which is sometimes fused with the pronotal spot. The basal angles are sub-rectangular, the margin of the pronotum slightly rounded basally and gradually restricted anteriorly toward the head. Pronotum distinctly not as wide as the elytra. The beak is moderate in length, stout and distinctly red in colour. Eye spots distinct and linear.

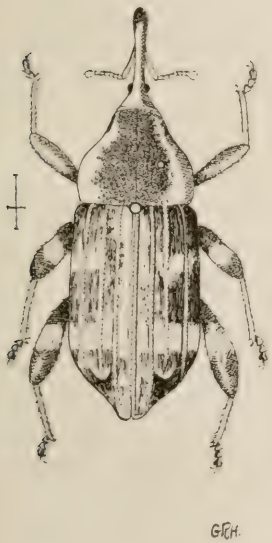

Fig. 15.
Pissodes terminalis, sp. nov.

Length 5.5 mm. to 6.3 mm.

Host tree.—*Pinus contorta* Dougl.

Distribution.—Sierra Nevada Mts. from Kern to Lassen Counties, California. Type locality, Chester, Plumas Co., California.

Type.—♂ and ♀ in the collection of the author where the species is represented by a series of 10 specimens. Paratypes are in the collection of the Entomological Branch at Ottawa, and the collection of the California Academy of Sciences at San Francisco. The distribution of the scales is more like *P. schwarzi* than that of any other species, except that the posterior band does not stop at the second interspace. Dr. Hopkins' key brings it nearer to *Pissodes fasciatus* Lec., from which it differs in the distinctly elevated third interspace. The accompanying illustration was drawn by my son, George Hopping.

The work of this beetle was first noticed by the writer in 1907 in Kern County, California, near Cannel Mdws. at an elevation of about 7,000 feet. Later it was found distributed from the region of Mt. Whitney to Lassen County,

California. The most epidemic of its depredations, however, was near Chester in Plumas Co. Here large areas of poles and saplings in lodgepole pine stands had seriously suffered from its attacks. While the terminals of the limbs were often infested the general attack was on the terminal of the stem. Depredations had continued in many trees for three successive years. This resulted in giving the trees a squat appearance, caused by curtailing the height growth with a consequent stimulation of lateral growth. Some areas of reproduction around Chester were badly infested by the fungus *Peridermium harknessii*. These areas were almost devoid of Pissodes attacks, and in the infested areas where infection from fungus was slight the Pissodes attacks were largely in the healthy trees. The terminal is generally killed down to and sometimes including the first whorl of branches. The larvæ mine the centre of pith of the terminal, each terminal producing from one to six adult weevils. The transformations take place in the fall, the adult apparently hibernating through the winter in the larval gallery. In many places the larvæ were heavily parasitized by a small dipterous insect.

AN INTERESTING OTIORHYNCHIDE WEEVIL FROM VANCOUVER ISLAND (COLEOPTERA).

BY H. F. WICKHAM,
Iowa City, Iowa.

Several years ago, I received from Mr. A. W. Hanham, of Duncan's, B.C., a few specimens of a weevil different from anything that I had seen in the North American fauna. It had much the appearance of some of the European species of Otiorhynchus and because of the general obscurity of the classification of the Otiorhynchidæ I did not feel at all sure as to its place in the system. Nothing in the Le Conte and Horn "Rhynchophora" matched it very well, either specifically or generically, and I put it aside as something new, to be described later. Not long ago, after seeing some specimens of *Phymatinus gemmatus* Lec., from Oregon, I was satisfied that the Vancouver Island species was pretty closely related, and wrote out a description referring the supposed novelty to the same genus, but fortunately discovered at almost the last moment that Dr. W. Dwight Pierce had already named a specimen from Oak Point, Wash., *Panscopus* (*Phymatinus*) *sulcirostris*. The Vancouver Island examples agree with his description in nearly every respect, and I do not think that there can be any reasonable doubt as to their specific identity. However, as it is likely to figure in economic literature as a foe to flower gardens of British Columbia and the adjacent regions, I am allowing my description to stand, under the specific name that he has used, *Phymatinus sulcirostris* Pierce.

Form only moderately stout, hardly elongate, sides subparallel. Head rather narrow, eyes slightly oblique, broadly oval, prominent, limited behind by a groove. Rostrum moderately long, squarish in section at base, the height and breadth at that point being about equal, thence gradually and regularly

becoming about one-half wider to the tip, punctuation close, rather fine but deep and more or less confluent, extending well back on to the interocular area, median impressed line deep at middle, becoming evanescent between the eyes and just before the rostral apex. Vertex very finely and sparsely punctate. Above each eye is a band of pearly scales. Scrobes anteriorly visible from above, broad, becoming wider and shallower posteriorly, the deeper median portion directed against the lower border of the eye. Antennæ rather stout, scape reaching about to the middle of the eye, funicle a little longer, second joint about one-half longer than the first, third to sixth subequal, each about as long as wide, seventh a little longer and heavier, club oval, pointed, slightly annulate, pubescent except at base. Prothorax barely longer than wide, moderately convex longitudinally as well as transversely, apex truncate, about three-fifths as wide as the base, which is feebly bisinuate, sides divergent but nearly straight to the point of greatest width a little in front of the middle, thence subparallel but slightly concave to the base. Disk closely clothed with pearly scales through which protrude moderate sized mostly scattered granules, each with a median puncture. Middle line distinctly but not strongly canaliculate. Scutellum minute, transverse, scaly. Elytra conjointly slightly arcuately emarginate at base, wider just behind the obliquely rounded humeri, thence nearly parallel sided to behind the middle, whence they are arcuately narrowed to the apex. Disk convex, strongly declivous behind, densely covered with pearly scales and with rows of granules like those on the prothorax. Beneath roughly and, in general, closely and rugosely punctured, a patch of scales on each side of the metasternum and of the second abdominal segment. Middle and hind legs with an incomplete femoral annulus beyond the middle, more pronounced on the hind pair. Tarsi hairy above, first three joints golden pubescent beneath, third joint broad, bilobed. Claws simple, approximate at base and only slightly divergent. Length, excluding rostrum 9.50 mm., of rostrum about 1.75 mm. Width across elytra 4.20 mm.

Compared with *P. gemmatus* Lec., this species is similar in a general way, but that insect has the beak carinate instead of grooved, the antennæ more slender, the legs uniformly scaly and the elytral granules smaller as well as differently arranged. In *P. sulcirostris* the elytral vestiture is mostly condensed into an irregular curved band extending from the humerus to a point near the suture a little behind the middle, and a large, irregular patch before and extending to the apex.

The specimens communicated to the National Collection of insects at Ottawa, and to myself, were all sent by Mr. Hanham, who, however, informs me that he did not capture them himself. They were found at Quamichan Lake, nearby, and were handed to him by his neighbor, Mrs. Ethel A. Leather, who found them first early in May, 1916, feeding upon the leaves of *Lilium pardalinum*, in the broad light of warm and sunny days. She found many hundreds of the beetles, most of which were destroyed, and, on digging about the roots of the lilies, quantities of the larvæ and a few pupæ. There is every likelihood that the species may reappear as a pest of some importance along the north Pacific coast.

SOME NOTES ON THE ERIOPHYIDÆ (ACARINA) IN BRITISH COLUMBIA.

BY R. GLENDENNING,
Duncan, B.C.

In 1908 the writer noticed an infection of Big Bud on some black currant bushes that had been imported from England to a nursery on Vancouver Island. The affected bushes were destroyed, but in 1914 this pest was again noticed on bushes in a private garden which had been supplied from this nursery.

Upon the attention of the Dominion Entomological Branch being called to this through their Field Officer for British Columbia, Mr. R. C. Treherne, this officer and the late Dr. Hewitt visited the affection, and a thorough inspection was arranged for and made under the Provincial Department of Agriculture. This resulted in the finding and destroying of nearly eight hundred bushes which had been distributed from the nursery to various places on Vancouver Island. The possibility of the pest spreading to the various wild species of Ribes was not lost sight of; but it was not until 1916 that some bushes of *Ribes bracteosum* Dougl. (the wild black currant frequent by stream sides on the Pacific slope) were quite accidentally noticed to be affected.

These had apparently become affected by cuttings of infected bushes being placed, by a farmer for rooting purposes, in the sandy alluvium of a stream bed about one-half mile up stream; some of the cuttings being afterwards washed out by a flood. These bushes are still bearing the affection, though the mite is not making much headway.

Big Bud, I might here state for the benefit of those unacquainted with the pest, is caused by a true mite, which living hidden in the tightly-folded buds of the black currant sucks the juices therefrom, causing the buds to swell, become spherical instead of pointed, and finally to drop off during the summer without having expanded properly. Many hundred mites are located in one bud, and when the adult stage is reached in spring the mites migrate to the new buds. The result is partial, or in unchecked cases, total defoliation of the bushes; and from the fact that the mites are hidden in the buds for the greater part of the year and are so small when they do come out, intelligent spraying is very difficult and burning the affected bushes is usually resorted to, to get rid of this pest. This was the first record of this pest in N. America.

At Agassiz, on the Mainland, the frequent affection of the native hazel (*Corylus californica* Rose) with a similar mite was noticed; the pest having a good hold on this plant which is very common in some parts of the Fraser Valley, and eventuallytwo other native shrubs were noticed affected with the same mite, namely, *Ribes lacustre*, a very spiny gooseberry-like shrub, and *Ribes bracteosum*, the wild black currant--the same species that became affected on Vancouver Island with the escaped European mite.

A very interesting point is here raised by these discoveries regarding the specific identity of the mites on these plants, both in British Columbia and England. In England four species are commonly mentioned in reference books, namely, *Eriophyes avellana*, *E. ribis*, *E. grossulariæ*, and *E. pyri*, being named from their respective hosts. The last named, *E. pyri*, the common Pear leaf blister mite does not now interest us. The other three are not considered specifically distinct by some authorities in England and the finding of

the native hazel, gooseberry and currant as above mentioned, all affected by a mite which has every appearance of being the same, lends colour to the probability that the three forms found in England are not good species and would be transferable from one host to another. That this is what happens at Agassiz I have very little doubt.

In 1906 the late George Massee conducted some experiments at Wisley Gardens, England, with a view to testing the possibility of transferring the mite on the hazel, (*C. avellana*) to the cultivated black currant. The plan of his experiment, with which the writer had the pleasure of assisting, was to plant alternate bushes of infected hazels and clean black currants at a distance of about four feet and to observe if by ordinary means the mite on the hazel would attach itself to the currants.

Although the result of the experiment pointed to the immunity of the currant from the hazel mite the test was not sufficiently long or thorough for positive proof on that point.

That the hazel *C. californica* is the original and chief host of this pest in British Columbia there is little doubt. It is the exception and not the rule to find a bush of *Ribes* affected. On the South-eastern portion of Vancouver Island, where the hazel is quite scarce, I have never found the mite on either this shrub or on any *Ribes* sp. (with the exception of the previously-mentioned instance where the European mite had escaped), while at Agassiz the hazel is very common and is everywhere badly affected, in some cases 75% of the buds being arrested in development by the work of the mite.

Some European hazels on the Dominion Experimental Farm at Agassiz were also found to be affected by bud mites; whether imported with them on recent migrants from the neighboring woods it would be difficult to say.

The fact that this pest, which apparently lives on both hazel and currant, and is strongly entrenched in the Lower Fraser Valley, will have a retarding influence on the planting of these districts with small fruits, especially black currants; and it would certainly be folly to let any large acreage be planted until more investigational work has been done on this pest, and the fact that it will not affect the cultivated varieties of black currant and gooseberry has been proven beyond all doubt.

NEW RHOPALOCERA FROM THE FAR EAST.

BY WARO NAKAHARA, A.M., PH.D.
Elmhurst, Long Island, N.Y.

Leptidia inornata, n. sp.

Related to *L. amurensis* Mén.; both wings broader; upperside of fore wing devoid of the apical dark patch.

Male.—Wings broad, much broader than in *L. amurensis;* rounded at the apex. Upperside soft silky white, without markings except a dark suffusion along the anterior margin toward the base of the fore wing. Underside similar to the upperside in fore wing; hind wing with two nebular groups of dark atoms in the limbal area; the larger one extending from the 2nd to the 4th interspace, paralleling the hind margin, and the other, smaller one from the anterior angle obliquely toward the middle of the 5th interspace.

Expanse.—1⅞ inches.

Holotype.—♀, Sapporo, Hokkaido, Japan, July 18, 1916, (S. Kuwayama). Type in the collection of the author.

On account of its broad wings, this species resembles a certain form of *Pieris napi* L., and in fact it has often been so identified. In his list of the butterflies of Hokkaido, Mr. S. Kuwayama refers to this species as *P. napi* saying that it is not rare in that Island, but not found in the Main Island of Japan. In reality, this species belong to the genus *Leptidia*, as can be easily told by the small size of the discal cells of the wings.

Polygonia asakurai, n. sp.

Very close to *P. c-album* L.; black markings above generally heavier; a distinct black belt in the limbal area of hind wing; the white mark in middle of hind wing beneath V-shaped, with its arms widely open.

Male.—Fore wing above fulvous with an elongated black patch across the cell and at the end a larger patch of similar shape; an elongated sub-apical patch on the costa and one on the inner margin well separated; a row of three round spots running from the inner margin toward the lower end of the sub-apical patch, the first spot, which is cut by the vein II, being the largest; outer border blackish brown. Hind wing fulvous with three conspicuous black patches of about the same size in the discal area; a row of black spots forming a belt in the limbal area, running from the costal margin toward the anal angle; this belt and the dark brown outer border enclose a submarginal row of fulvous spots. Underside marbled with various shades of brown and ochre, and streaked with fine dark brown lines; the discal band across the wings irregular and indistinct. Fore wing with a grayish white patch on the costa externally to the discal band; a row of elongated olivaceous spots before the outer margin. The similar olivaceous spots less distinct in hind wing; a limbal series of round olivaceous spots; the discal band marked with an interrupted wavy black line on each side; the white mark in the middle V-shaped, with its arms of about equal length opening widely to form an angle of about 135 degrees.

Expanse.—1¾ inches.

Holotype.—♀, Horisha, Formosa, (K. Asakura), April 23, 1919. Type in the author's collection.

Oeneis pseudosatyra, n. sp.

Related to *O. nanna* Mén.; wings wood brown; eye-spots pupiled with purplish white. Hind wing beneath without eye-spots; an ill-defined dark wavy belt accompanied by a grayish cloud across the wing; no grayish markings in the basal area.

Male.—Upperside of fore wing wood brown, darker toward the base; an eye-spot, pupiled with purplish white, in the 2nd, and a larger one in the 5th interspace; brownish ring around the eye-spot indistinct. Hind wing similarly coloured, with four eye-spots similar to those of fore wing, the eye-spot in the 4th interspace much smaller than others, the one in the 2nd interspace being the largest. Underside a little lighter. Fore wing with the eye-spots of the upperside repeated; a faint dark submarginal line, and another one across the limbal area; a short, dark bar at the end of the cell; a grayish patch at the apex, whence it extends in a very narrow line half way along the outer margin. Hind

wing with an irregular dark brown belt, accompanied externally by a grayish nebular band, running from the middle of the costal margin to the anal angle; the row of eye-spots of the upperside replaced by a dark, regularly wavy submarginal belt; a grayish patch on the anterior angle, extending for a short distance along the anterior margin; another grayish patch at the end of the cell; the outer margin narrowly bordered with grayish.

Expanse.—1 4/5 inches.

Holotype.—♂, Horisha, Formosa, August 13, 1919, (K. Asakura). Type in the collection of the author.

The wood brown colour of the wing, closely resembling that of *Satyrus* marks this species very well in the genus *Oeneis*. This singular species of *Oeneis* forms an exception in this genus of "Arctics," on account of its occurrence in subtropical territory.

A NEW APHODIUS FROM BRITISH COLUMBIA. (COLEOPTERA-SCARABÆIDÆ).

BY RICHARD T. GARNETT,
Oakland, California.

Aphodius canadensis, sp. nov.

Form moderately elongate and convex, twice as long as wide, (form similar to that of *A. aleutus* var. *ursinus* Motsch.); black, shining, side margins of thorax a faint reddish-brown (wider at anterior angle), front margin of thorax narrowly yellow, sides of head with a faint brownish lustre, femora piceous, tibiæ rufo-piceous, tarsi paler. Antennæ rufo-testaceous, the club darker; palpi pale. Head moderately convex, an elevated tubercle at middle, and a small flattened tubercle on each side at the angulation of the clypeal suture; the suture elevated on each side from the angulation to the lateral margin; surface punctulate, more finely at middle, coarser on the sides and base; clypeus broadly and deeply emarginate, the angles on each side obtuse and rounded, the sides arcuate, the genæ more prominent than the eyes, fimbriate laterally, the fimbriations longer beneath the genæ, plainly visible from above. Thorax convex, broader at base than apex, narrowly margined, not explanate, sides slightly arcuate and finely fimbriate; hind angles broadly rounded, apical margin straight, base arcuate; disc finely closely punctate, intermixed on basal half and at sides with small cribrations; basal line distinct. Scutellum small, the base moderately closely punctured, the apex smooth. Elytra a little wider behind the middle, slightly narrower than the thorax at their junction, epipleuræ fimbriate on the basal third; disc glabrous, coarsely striate, the striæ strongly densely punctured on the basal three-quarters, less strongly apically; intervals nearly flat and finely closely punctured. Abdomen closely punctured, the punctures bearing rather coarse hairs. Mesosternum very prominently carinate between the coxæ, opaque and alutaceous in front. Anterior tibiæ punctate on the anterior face, the punctures setigerous and placed in a straight line from base to apex and nearer the outer edge; also a few terminal and lateral punctures; acutely tridentate, distinctly crenate above the basal tooth. First joint of anterior tarsus equal to the second. Posterior tibiæ stout, the posterior marginal fimbriations

long and unequal. First joint of hind tarsus equal to the following three. Length (.24 inch) 6 mm., width (.12 inch) 3 mm.

Type and paratype in the author's collection, collected at Cranbrook, British Columbia, July 12, 1919, and May 14, 1919, by Mr. C. B. Garrett. Four other paratypes of the same lot were studied, three from Cranbrook and one from Crow's Nest, B.C., secured between April 17, 1915, and May 14, 1919. Two of these are in the collection of C. B. Garrett, one is deposited in the collection of the California Academy of Sciences, and one in that of Dr. E. C. Van Dyke. Taking the entire series into consideration the length varies from 6–7½ mm. The carination of the mesosternum in two of the specimens was less pronounced than in the others, but nevertheless distinct.

This species has the form and general appearance of *A. aleutus* var. *ursinus* Motsch., and probably has been confused with it in collections. The long and unequal fimbriation of the hind tibiæ and the carinate mesosternum, however, serve to easily distinguish this from *ursinus* as well as from other black, shining species. According to the characters given by Dr. Horn* this would fit into Group 1-b with *rubeolus*, *stercorosus*, and the more recently described *troglodytes* and *campestris*, from which it is easily distinguishable, having an entirely different facies, colour, size, etc. An examination of boreal and Alaskan material in the cabinet of Dr. Van Dyke was made and no form parallel in structure could be found.

A key to this Group 1-b revised to date follows:—

1. Smaller—3–5 mm.; above not black, varying in colour.....2
— Larger—6–7½ mm.; more robust; black, head tuberculate; posterior tibiæ stout; sides of thorax with large and small punctures. British Columbia.....*A. canadensis*, sp. nov.
2. Posterior tibiæ stout; first joint of hind tarsus not as long as the next three; head not tuberculate; 3½–5 mm. Middle States to Missouri Texas, also rare in Massachusetts.....*A. rubeolus* Beauv.
— Posterior tibiæ rather slender.....3.
3. Sides of thorax with large and small punctures intermixed; 3½–4¼ mm. All east of Mississippi and north to Dakota.....*A. stercorosus* Mels.
— Sides of thorax finely punctulate, without coarse punctures.....4
4. Elytral intervals smooth; head and thorax reddish or pale chestnut brown; elytra brownish yellow. 3 mm. Sarasota, Fla. From beneath cow droppings.....*A. campestris* Blatch.
Elytral intervals with sparse fine punctures; colour honey yellow or reddish yellow. 3–3.8 mm. Crescent City, Fla. From tortoise burrows.....*A. troglodytes* Hubbard.

Mr. Garrett, to whom I am indebted for my specimens of *A. canadensis*, says that it is found rather abundantly at Cranbrook, which is in the southeastern part of British Columbia.

Of the five species mentioned in the key to the group *A. campestris* Blatchley is the only one I have not examined. The characters given in the table will serve to separate it from *A. troglodytes* Hubbard, although the punctuation of

*Dr. John Horn, Monograph of Aphodiini of U. S., Trans. Amer. Ent. Soc., Vol. 14, 1887, pp. 1-110.

the elytral intervals in the latter is sometimes very fine and a good magnification is necessary. Judging by their descriptions there is little to choose between these two species except their different habits. Greater differences might be noted if the descriptions of both species were not so abbreviated.

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A. troglodytes Hubbard, Insect Life, 1894, p. 312.
A. campestris Blatchley, Canadian Ent., Vol. 44, 1912, p. 330.
A. canadensis, sp. nov.

NEW OR LITTLE-KNOWN CRANE-FLIES FROM TROPICAL AMERICA (TIPULIDÆ, DIPTERA).

BY CHARLES P. ALEXANDER,
Urbana, Ill.

The majority of the new species described herein as new were secured by Mr. Herbert S. Parish along the Amazon River. The new *Teucholabis* was secured by Prof. Hine in Guatemala, and sent to me through the kindness of Dr. Kennedy. The new species are preserved in the collection of the author.

Teucholabis pabulatoria, sp. n.

Size very small (wing under 4 mm.); head gray; general coloration reddish yellow; pleura with an appressed gray pubescence; wings hyaline, the stigma small and ill-defined; Sc_1 ending just beyond the origin of *Rs;* R_{2+3} in alignment with *Rs;* cell R_3 very wide at the wing-margin.

Male.—Length 3.6 mm.; wing 3.5 mm.

Female.—Length 3.8 mm.; wing 3.7 mm.

Rostrum reddish brown; palpi dark brown. Antennæ with the scapal segments dark brown, sparsely pruinose; flagellum broken. Head light gray.

Pronotum reddish yellow. Mesonotum reddish brown, the præscutum without distinct stripes. Pleura reddish yellow, the ventral sclerites with a heavy, grayish white pubescence. Halteres light brown, the large knobs dark brown. Legs with the coxæ reddish, sparsely pruinose; trochanters dull yellow; femora yellow, the tips broadly dark brownish black; tibiæ brownish yellow, the tips narrowly dark brown; metatarsi light brown, the apical third blackened; remainder of the tarsi black. Wings hyaline, the stigma barely indicated, brown; veins dark brown. The microscopic trichiæ on the wing-disk are here larger than is usual in the genus. Venation: *Sc* short, Sc_1 ending a short distance beyond the origin of *Rs*, Sc_2 a short distance from the tip of Sc_1, located before the origin of the sector; R_1 beyond *r* very short, the tip pale; *Rs* long, gently arcuated, in alignment with and subequal to R_{2+3}; *r* in alignment with the deflection of R_{4+5}; cell R_3 very wide at the wing-margin; R_{4+5} bending strongly to the wing-tip; inner end of cell *1st* M_2 lying a short distance proximad of the inner ends of cells R_3 and R_4; basal deflection of M_{1+2} and the outer deflection of M_3 almost obliterated; basal deflection of Cu_1 a short distance beyond the fork of *M*.

Abdomen brown, the sternites paler. Male hypopygium with the pleurites

short, the tips projecting far beyond the very simple chitinized, pleural appendages which are situated on the inner face; these appendages are two in number, one appearing as a slender, cylindrical, chitinized arm, the other appendage appears as a flattened plate which runs out into a small, chitinized point. From the hypopygium projects a long, slender rod, pale, the tip enlarged and slightly blackened. The homologies of this rod cannot be told from the material at hand.

Habitat.—Guatemala.

Holotype.—♂, Gualan, January 13, 1905, (J. S. Hine).

Allotype.—♀.

The types were taken from the mouth of a female damsel-fly (*Hetærina tricolor* Burm.) by Dr. C. H. Kennedy. By the writer's key to the American species of *Teucholabis* (Trans. Amer. Ent. Soc., Vol. 40, pp. 235–239; 1914), *Teucholabis pabulatoria* will run to *T. jocosa* Alexander from which it is readily told by its small size, the very different coloration of the thorax, and the venation.

Erioptera (Mesocyphona) cladophora, sp. n.

Generally similar to *E. annulipes* Williston; tibiæ with four brown bands; *2nd Anal* vein strongly sinuous and with a spur before its tip.

Male.—Length 2.8 mm.; wing 2.8 mm.

Female.—Length 3.5 mm.; wing 3.5–3.6 mm.

Generally similar to *E. annulipes*, differing as follows:

Most of the femora with four brown bands; tibiæ with four narrow brown bands, alternating with four subequal white areas; metatarsi with the base and apex dark brown; tarsal segments three to five and the end of the second dark brown. Wings with a faint brownish tinge; large whitish subhyaline areas occupy the ends of all the cells along the wing-margin; similar white areas in the ends of cells *R* and *M* and before the large spur of the *2nd Anal* vein in cell *1st A;* small brown spots at the ends of all the longitudinal veins; a narrow, dark brown seam along the cord; veins dark brown. Venation: Generally as in *E. annulipes* but the *2nd Anal* vein is very remarkably distinct; very strongly bisinuous, almost as in the genera *Helobia* and *Symplectomorpha*, before the last curve with a strong spur that juts into cell *1st A*, this spur directed cephalad and basad, in some specimens almost attaining vein *1st A* and thus appearing as a supernumerary cross-vein in cell *1st A* (as in the genus *Discobola*); this spur is surrounded by a dark seam. Male hypopygium with two long, slender pleural appendages, the outermost bifid almost to the base and thus appearing as two separate appendages; inner appendage longest and more strongly curved than in the others; gonapophyses appearing as a long, slender, slightly-incurved rod with the apex blackened.

Habitat.—Brazil.

Holotype.—♂, Manaos, October 31, 1919, (H. S. Parish).

Allotopotype.—♀, November 4, 1919.

Paratopotypes.—11 ♂'s ♀'s, October 22–31, 1919.

Sigmatomera amazonica Westwood.

1881 *Sigmatomera Amazonica*, Westwood, Trans. Ent. Soc. London, part 3, pp. 366, 367; pl. 17. Fig. 3.

The female sex of this beautiful crane-fly has never been described. One specimen was taken at Flores, Brazil, November 12, 1919, by Mr. H. S. Parish and may be described as allotypic.

Allotype.— ♀, length 11.5 mm.; wing 11.8 mm.

Rostrum and palpi very small, dark brown. Front obscure yellow. Antennæ black, the flagellar segments subcylindrical, feebly constricted beyond mid-length. Head moderately large, the vertex very narrow between the eyes and here with a sparse gray bloom; remainder of the head dark brownish black.

Thorax shiny black, the dorso-pleural membranes obscure yellow. Legs with the coxæ shiny black, the fore coxæ rufous apically; trochanters rufous; femora rufous, narrowly blackened basally and with the tips broadly black; tibiæ black, the bases a little paler; tarsi brownish black. Wings as in the male; cell *1st* M_2 open by the atrophy of the outer deflection of M_3.

Abdomen reddish, the seventh and succeeding segments black. Ovipositor with the tergal valves rather short and slender arising from a long basal shield, the apex dilated into a compressed tridentate blade, the ventral tooth larger and more flattened; from near the base of the tergal valves on the outer side, a pencil of long, curved, yellow bristles that are directed caudad and laterad; sternal valves of the ovipositor longer than the tergal valves, originating opposite the base of the dorsal shield, the tips acute.

Subgenus *Polymerodes*, subg. n.

Characters as in *Polymera*, s.s., but the tibial spurs lacking. Venation reduced, cell M_1 lacking and cell M_3 small, not longer than its petiole.

Type of the subgenus.—*Polymera* (*Polymerodes*) *parishi*, sp. n.

This new group is necessitated for the reception of three small species of *Polymera* in which the tibial spurs are quite lacking. In the typical subgenus, the tibial spurs are long and visible even with a hand-lens. It is very difficult to classify such forms since the females invariably run out to the genus *Erioptera* by means of the existing keys. The males have the beautiful bi-nodose antennæ of the typical subgenus. The species, besides the type, that are referable to this subgenus are *P. conjuncta* Alexander and *P. conjunctoides* Alexander.

The three known species may be separated by means of the appended key:

1. Size larger (wing of the male 4 mm. or over); antennæ conspicuously annulated, the base and apex of each flagellar segment light yellow, the remainder of the segment black; thoracic pleura with a very broad, black stripe that almost covers the entire region.....*parishi*, sp. n.
   Size small (wing of the male less than 4 mm.); antennæ uniformly black; pleura uniformly pale or with a narrow dark stripe.....2.
2. Thoracic pleura with a narrow but distinct black longitudinal stripe.....*conjunctoides* Alexander.
   Thoracic pleura without a distinct dark stripe, the pleura being approximately concolorous with the dorsum.....*conjuncta* Alexander.

Polymera (Polymerodes) parishi, sp. n.

Flagellar segments black, annulated with yellow; thoracic pleura largely black.

Male.—Length about 4 mm.; wing 4–4.5 mm.

Generally similar to *P. conjuncta* Alexander, differing as follows:

Size larger. Antennal flagellum with the individual segments distinctly annulated, black with the base narrowly, the apex more broadly, light yellow; each flagellar segment is binodose, the nodes with very long, outspreading verticils. The thoracic pleura has a very broad, brownish black stripe that extends to the abdomen; thoracic sternum also brownish black, the space between this and the pleura only slightly paler. Wings with a strong brown tinge; vein *Sc* shorter; R_{2+3} shorter than that section of R_1 beyond *r*. Abdomen black.

Habitat.—Brazil.

Holotype.—♂, Manaos, November 4, 1919, (H. S. Parish).

Paratopotype.—A badly-broken ♂, October 31, 1919.

Eriocera amazonicola, sp. n.

General coloration orange-yellow; antennal flagellum brownish black, the scutal lobes and posterior half of the mesonotal præscutum brownish; wings yellow, narrowly cross-banded and longitudinally streaked with brown, this including a narrow apical margin.

Male.—Wing 9.3 mm.

Female.—Length 12 mm.; wing 10.8 mm.

Frontal prolongation of the head reddish brown; palpi obscure brownish yellow. Antennæ with the scape fiery orange; flagellum dark brownish black, only the extreme base of the first flagellar segment brighter. Head fiery orange, the frontal tubercle moderately large and with a slight, impressed, median line.

Mesonotum obscure yellow, the præscutum behind and the scutal lobes more brownish; scutellum and postnotum more orange-yellow. Pleura yellow. Halteres yellow, the knobs dark brown. Legs with the coxæ and trochanters yellow; femora obscure yellow, the tips narrowly dark brown; tibiæ obscure brownish testaceous, the tips very narrowly darker brown; tarsi dark brown. Wings with a strong yellowish tinge, most conspicuous in the costal region and at the wing-base; anal cells more grayish; conspicuous brown seams at the origin of *Rs*, extending to beyond midlength of the vein; along the cord, extending as a narrow cross-band from the stigma to the posterior margin of the wing; a narrow seam around the wing-tip; veins R_{4+5}, M_3, Cu_1, the outer end of cell *1st* M_2, *Cu* and *2nd A* narrowly margined with brown; veins light yellow, darkened in the brown areas. Venation: *Rs* long; *r* just beyond the fork of R_{2+3}; inner ends of cells R_5 and *1st* M_2 in oblique alignment; cell *1st* M_2 rather small, subrectangular, shorter than the veins beyond it; basal deflection of Cu_1 just beyond the fork of *M*.

Abdomen with the tergites fiery orange, segments five and six darker basally; sternites orange-yellow. Ovipositor with the valves elongate, chitinized.

Habitat.—Brazil.

Holotype.—♀, Manaos, November 4, 1919, (H. S. Parish).

Allotype.—♂, Flores, November 12, 1919.

The male specimen is in poor condition, having been badly eaten by ants. The hypopygium is of the *Eriocera*-type but the penis-guard is very long and exserted, somewhat as in *E. longistyla* Alexander.

UNDESCRIBED AFRICAN CRANE-FLIES IN THE BRITISH MUSEUM. (TIPULIDÆ, DIPTERA).

BY CHARLES P. ALEXANDER,
Urbana, Ill.

For the past several years the writer has been engaged in preparing a monographic revision of the crane-flies of the Ethiopian Region. The collections of many of the museums in America, Europe and South Africa have been generously loaned me for study in the continuation of this work. The largest collections of tropical African Tipulidæ available are those of the British Museum (Natural History), and I would express my sincere thanks to Mr. F. W. Edwards for his kindness in sending me this material. The Limnobiinæ of this collection are discussed in another paper; part of the Tipulinæ are described in this article.

Genus *Habromastix* Skuse.

Habromastix edwardsiana, sp. n.

General coloration rusty-brown; wings pale brown, cells *C* and *Sc* and the wing-apex dark brown; a pale area before and beyond the stigma; fusion of M_3 and Cu_1 extensive; abdomen black, ringed with obscure yellow.

Male.—Length 10.5 mm.; wing 10.4 mm.; antenna 10.3 mm. Hing leg, femur 6.3 mm.; tibia 9 mm.

Female.—Length 10.3 mm.; wing 10.2 mm.

Rostrum and palpi pale brown. Head vertical in position, the frontal prolongation very short. Antennæ pale brownish yellow, brightest basally, the outer segments darker; scapal segments small; first flagellar segment enlarged basally; flagellar segments clothed with a long, erect pubescence and provided with a few, very tiny, black verticils. Vertex bright brown; head between the eyes broad.

Mesonotal præscutum rusty-brown without stripes; remainder of the mesonotum a little darker. Pleura pale brown, the mesepimeron a little brighter. Halteres pale brown, the base of the stem brighter, the knobs dark brown. Legs with the coxæ and trochanters brownish yellow; femora and tibiæ pale yellowish brown, the tips conspicuously blackened, the latter very narrowly; tarsi yellowish brown, only the distal segments darkened. Wings with a strong, brownish tinge; cells *C* and *Sc* dark brown; stigma dark brown; apices of cells R_2 and R_5 strongly darkened; cross-veins and deflections of veins indistinctly seamed with brown; a conspicuous whitish area before the stigma in cell *2nd* R_1 and a smaller, but similar, area beyond the stigma in the base of cell R_2; cells in the vicinity of *1st* M_2 indistinctly centred with paler; veins dark brown. Venation: *Rs* strongly arcuated at origin; tip of R_1 somewhat indistinct; basal deflection of R_2 nearly as long as *r*; cell *1st* M_2 pentagonal; petiole of *cell* M_1 about equal to *m*; basal deflection of Cu_1 just beyond the fork of *M*, the fusion of M_3 and Cu_1 being a little shorter than the basal deflection of M_{1+2}.

Abdomen with the first segment yellow; remaining segments with the basal and apical thirds black, the middle third obscure yellow, producing a narrow, pale-ringed appearance; eighth and ninth segments black. In the female, the abdomen is almost uniformly drak brown in colour and greatly distended with eggs. Male hypopygium of an unusually generalized structure,

not unlike that occurring in the subfamily Limnobiinæ; ninth tergite almost straight across the caudal margin; pleurites subcylindrical, each with two pleural appendages, borne at the apex; the outer appendage is flattened, pale, elongate-oval in outline; inner appendage flattened, clothed with conspicuous dense hairs; on the dorsal face before the tip produced into a long, blackened point that extends beyond the other parts of this appendage; pleural suture indicated only beneath, straight. Ninth sternite membranous, the caudal margin with a deep, rounded, median notch. Penis-guard a simple, cylindrical rod. Anal tube conspicuous, pale. Ovipositor with the tergal valves compressed, strongly upcurved, the tips subacute; sternal valves very compressed and flattened, the tips obtusely rounded.

Habitat.—Ashanti.

Holotype.—♂, Obuasi, June 20, 1907, (Dr. W. M. Graham), B. M. No. 1908–245.

Alloiopotype.—♀, in the copula with the male.

The types were caught in dense bush on a leaf.

Type in the collection of the British Museum (Natural History).

Habromastix riedeliana, sp. n.

Antennæ moderately elongated; mesonotum yellowish red, unmarked with darker; wings pale brown, the costal region slightly darker; fusion of M_3 and Cu_1 punctiform; abdomen yellow, striped longitudinally with black.

Male.—Length about 11.8 mm.; wing 11.5 mm. Hing leg, femur 7.5 mm.; tibia 9.7 mm.

Female.—Length about 12 mm.; wing 11.5 mm.

Frontal prolongation of the head short but evident, brownish yellow; nasus lacking; palpi short, dark brown. Antennæ moderately elongate, in the male, if bent backward, extending about to mid-length of the abdomen; but nine flagellar segments; scape and basal swelling of the first flagellar segment yellow, remainder of the flagellum dark brown, clothed with a dense, erect, pale pubescence; verticils short and sparse. Head brownish, covered with a pale pollen; no vertical tubercle; vertex between the comparatively small eyes broad.

Mesonotum light yellowish red without darker markings. Pleura obscure yellow. Halteres long and slender, pale yellow, the knobs dark brown. Legs with the coxæ and trochanters yellow; femora yellow basally, the outer half pale brown, the tips dark brown; tibiæ pale brown, the tips narrowly dark brown; tarsi brown. Wings with a pale brownish tinge, the costal and subcostal cells, and the stigma, slightly darker brown; veins indistinctly seamed with brown; an indistinct whitish spot before the stigma in cell *1st* R_1 and another crossing cell *1st* M_2; veins dark brown. Venation: *Rs* rather short and feebly arcuated, about equal to R_{2+3}; cell R_2 large, veins R_2 and R_3 divergent; cell *1st* M_2 rather small, pentagonal; petiole of cell M_1 about one-half longer than *m*; fusion of M_3 and Cu_1 very slight, almost punctiform.

Abdomen yellow, heavily lined with black; basal tergite yellowish brown; second tergite yellow with brown median and lateral stripes; tergites three to seven with the conspicuous median and lateral stripes broadly connected apically so that only the sides at the base are of the obscure yellow ground-colour. Eighth

segment entirely black; hypopygium reddish. Abdomen of female dark, distended with eggs; ovipositor reddish horn-colour. Male hypopygium somewhat as in *H. edwardsiana;* ninth tergite with a shallow median notch and broader and slightly deeper lateral notches. Sterno-pleurite prolonged considerably beyond the level of the tergite, the pleural appendages borne at the apex; outer appendage slender, pale; inner appendage a flattened blade with the apex bifid, the base rounded and tumid, densely hairy. Ninth sternite with a very deep and narrow U-shaped median notch. Eighth sternite with a very low V-shaped notch, the margin unarmed. Ovipositor with the tergal valves comparatively slender; sternal valves long, compressed, the tips obtuse.

Habitat.—Nyasaland.

Holotype.—♂, Mt. Mlanje, January 6, 1913, (S. A. Neave).

Allotype.—♀, January, February, 1914, (J. B. Davey).

Presented by the Imperial Bureau of Entomology 1913-236, 1915-58.

Type in the collection of the British Museum (Natural History).

Genus *Tipula* Linnæus.

Tipula (Tipulodina) milanjii, sp. n.

Coloration orange-yellow; præscutum and scutum largely shiny black; legs black, the tibiæ with a broad whitish ring beyond the base; wings brownish yellow, stigma oval, dark brown; abdomen orange-yellow, the tergites ringed caudally with velvety black.

Female.—Length about 26.5 mm.; wing about 21.5 mm.; abdomen alone, 19.2 mm. Fore leg, femur 10.7 mm.; tibia 13.3 mm.; metatarsus, 9.8 mm.; 2nd tarsal segment 3.1 mm.; 3rd to fifth tarsal segments 3 mm. Hind leg, femur 13.8 mm.; tibia 15 mm.

Frontal prolongation of the head rather short, clear orange-yellow; nasus short and stout; mouth-parts and palpi brown. Antennæ with the scapal segments fiery orange; flagellar segments cylindrical, dark brown; verticils rather short. Head fiery orange; a small black spot on the ventral side adjoining the inner margin of the eye; vertex broad, eyes small.

Pronotum yellow. Mesonotum yellow, the præscutum with three broad, shiny black stripes, the narrow interspaces opaque velvety-black so the dorsum appears to be almost entirely black, only the lateral regions of the ground colour; scutal lobes shiny black; scutellum clear light yellow, the lateral wings brown; postnotum light yellow. Pleura light orange-yellow. Mesosternum a little infuscated. Halteres dark brown, the base of the stem narrowly pale. Legs with the coxæ and trochanters orange-yellow; femora dark brownish black, the extreme base brighter; tibiæ black with a rather broad (1.7 mm.) whitish ring just beyond the base; tarsi brownish black; metatarsi much shorter than tibiæ; femora slightly enlarged apically; claws of female simple, empodia pale. Wings rather broad, with a pale brownish yellow suffusion; cell *C* light brown, cell *Sc* dark brown; stigma dark brown, oval; indistinct brown seams along the cord; veins dark brownish black. Venation: *Rs* rather short, slightly arcuated; R_2 short, about one-half the length of R_{2+3}; *m-cu* very short but present.

Abdomen with tergites one to five orange-yellow; segments two to five with the posterior margins deep velvety-black and sending a paler brown band cephalad to the anterior margin of the segments; tergites six and seven similar

but the basal half entirely dark brown; eight and nine orange; sternites generally similar, segments two to five with a brown posterior band, reduced to a triangle on the second and third segments, the second segment with an additional brown band near midlength; segments six and seven dark brown, the caudal margin very narrowly yellow. Ovipositor with the tergal valves long and slender, the tips curved a little ventrad; sternal valves compressed, the tips broadly rounded.

Habitat.—Nyasaland.

Holotype.—♀, Mt. Mlanje, November 21, 1912, (S. A. Neave).

Presented by the Entomological Research Committee 1913–394.

Type in the collection of the British Museum (Natural History).

This magnificent crane-fly is apparently related to the much smaller and less brightly coloured *Tipulodina kinangopensis* Riedel (British East Africa) and is referred, provisionally, at least, to the subgenus *Tipulodina* Enderlein. The white tibial bands in the present species suggest that this reference is correct although the two African forms are very much more brightly coloured than the numerous Oriental species as known. *Tipula milanjii* in its general appearance suggests a large and handsome species of *Nephrotoma*.

Tipula silinda, sp. n.

Allied to *T. jocosa;* mesonotal præscutum yellow with three yellowish stripes that are margined with brown; lateral and anterior margins of the præscutum dark brown; postnotum yellow, the caudal margin dark brown including a dark brown spot above the base of the halteres; pleura yellow, faintly marked with brown; legs yellow, tips of the femora broadly blackened; wings brownish subhyaline, a darker brown spot at arculus, stigma dark brown, brown seams along the cord; whitish obliterative areas beyond the arculus and before the stigma; cell *1st* M_2 ample; abdomen brownish yellow, margined sublaterally with dark brown.

Female—Length 25 mm.; wing 22.5 mm.; abdomen alone, 17.8 mm. Fore leg, femur 14.5 mm.; tibia 17.8 mm.; metatarsus 16.2 mm.

Frontal prolongation of the head brownish yellow; mouth-parts and palpi brown. Antennæ with the scape and basal two or three flagellar segments yellow, the remainder of the flagellum passing into dark brown; verticils long and conspicuous. Head obscure brown.

Pronotal scutum light brown; scutellum more yellowish. Mesonotal præscutum obscure yellow, the three stripes concolorous and evident only by their brown margins; median stripe with the lateral margins ill-defined at midlength and with a broad, brown median stripe; lateral stripes with the brown margins distinct, the lateral margin broader than the proximal; at the anterior ends of the lateral stripes a large, rounded, dark brown spot; anterior margin of the præscutum narrowly dark brown; scutum obscure yellow anteriorly, dark brown posteriorly, this colour confluent across the median line; scutellum with the median area yellow, narrowly margined caudally with brown, the lateral wings of the scutellum similarly yellow but here margined anteriorly with brown; postnotum with the median sclerite yellow with two indistinct brown lines, the caudal margin with two dark brown spots; lateral sclerites of the postnotum yellow, the dorsal anterior margin brown, extending to beneath

the wing-root; ventral posterior margin, immediately dorsad of the base of the halteres conspicuously dark brown. Pleura yellow, a pale brown cloud on the dorsal margin of the mesosternum and another on the caudal margin of the mesepimeron. Halteres with the base and knobs conspicuously light yellow the remainder of the stem dark brown. Legs with the coxæ yellow, the outer face of the posterior coxæ infumed; trochanters yellow; femora yellow, the tips broadly (1.8 mm.) and abruptly blackened; tibiæ brownish yellow, the tips rather narrowly dark brown; tarsi brown, darker distally. Wings with a faint brownish tinge, cell *Sc* more brownish yellow; stigma brown; a brown spot at the arculus; brown seams along the cord, outer and anterior margin of cell *1st* M_2; obliterative areas beyond arculus and before the stigma; veins dark brown. Venation: similar to *T. pomposa* but veins *Rs* and R_{2+3} in alignment; *Rs* shorter than R_{2+3}; vein R_3 bent a little toward R_{4+5} (as in *T. alphaspis*); cell *1st* M_2 very large, roughly rounded-oval in outline; fusion of M_3 and Cu_1 extensive, longer than the basal deflection of M_3.

Abdomen with the basal tergites obscure yellowish, beyond the second more brownish; lateral margins of the segments narrowly light yellow; a broad, dark brown, submarginal stripe; sternites more uniformly reddish yellow. Ovipositor with the tergal valves very long and slender, straight, divergent; sternal valves ending about opposite mid-length of the tergal valves, compressed.

Habitat.—Southern Rhodesia.

Holotype—♀, Mt. Chirinda, Melsetter District, altitude 3,800 feet, June 11, 1911, (C. F. M. Swynnerton).

Presented by the Entomological Research Committee 1912–145.

Type in the collection of the British Museum (Natural History).

Tipula silinda is somewhat similar to *T. pomposa* Bergroth but is very distinct in the details of coloration and structures. It is closer to *T. jocosa* Alexander (Cape Colony—Natal) and *T. masai*, sp. n. (British East Africa) as discussed under this latter species. The specific name, *silinda*, is the Zulu form of Chirinda, for the explanation of which I am indebted to Dr. G. A. K. Marshall.

Tipula masai, sp. n.

Allied to *T. jocosa;* antennæ yellow; wings grayish subhyaline, variegated with brown seams and hyaline spaces in certain of the cells.

Female.—Wing 18 mm. Middle leg, femur 9.5 mm.; tibia 10.5 mm. Hind leg, femur 10 mm.; tibia 12.1 mm.

Frontal prolongation of the head rather slender, brownish yellow, paler ventrally, with a narrow, brown, lateral line; mouth-parts yellowish; palpi dark brown. Antennæ light yellow, only the distal segments darker coloured. Head reddish brown.

Pronotum light brown. Mesonotal præscutum obscure yellow with four narrow, light yellow stripes that are narrowly margined with dark brown so as to practically obliterate the ground colour; intermediate stripes bent away from one another near mid-length, exposing a linear strip of the ground colour; anterior and lateral margins of the præscutum dark brown; scutum yellow, the lobes indistinctly margined anteriorly with brown, the posterior half broadly and conspicuously margined with brown, this colour bridging the posterior half

of the median area; scutellum and postnotum obscure brown; a slightly darker brown spot on the lateral sclerites of the postnotum above the base of the halteres Pleura indistinctly marked with pale brown and whitish. Halteres light brown, the base of the stem and the knobs conspicuously light yellow. Legs with the coxæ and trochanters yellow, the outer face of the middle coxæ infuscated; femora yellow, a little brightened immediately before the broad, black tips; tibiæ obscure yellow, the tips narrowly and indistinctly darkened; tarsi light brown, passing into darker brown at the tips. Wings grayish subhyaline, sparsely marked with brown and variegated with hyaline; costal cell slightly more yellowish, the subcostal cell brownish yellow; stigma brown; conspicuous brown seams at the origin of *Rs;* along the cord in the bases of cells R_3 and R_5; completely surrounding cell *1st* M_2 and at the fork of M_{1+2}; deflection of Cu_1 broadly seamed with brown; a large brownish area near the arculus in the bases of cells *R* and *M;* a large obliterative streak along the cord, extending from before the stigma, across cell *1st* M_2 into the base of cell M_4; smaller hyaline areas beyond the stigma, in the bases of cells M_1 and *2nd* M_2; and two others in the end of cell *1st A*, one adjoining vein *1st A*, the other nearer the *2nd Anal* vein; veins dark brown. Venation: somewhat as in *T. jocosa*, differing as follows: *Rs* longer, a little longer than R_{2+3}; base of R_2 before *r* longer, apex of R_2 beyond r long and almost straight; cell *1st* M_2 roughly oval in outline, the basal deflection of M_{1+2} being shorter than the deflection of M_{3+4}; M_{1+2} between *r-m* and *m* long, evenly and gently arcuated; petiole of cell M_1 shorter than *m; m-cu* short but evident.

Abdomen broken beyond the base, the first tergite brown, narrowly margined caudally with yellow; base of the abdomen filled with large eggs.

Habitat.—British East Africa.

Holotype.—♂, Southeastern slopes of Mt. Kenya, altitude 6,000–7,000 feet, February 3–12, 1911, (S. A. Neave). B. M. No. 1912–70.

Type in the collection of the British Museum (Natural History).

Tipula masai is told from the related *T. jocosa* and *T. silinda* by the different pattern of the posterior sclerites of the mesonotum. From *jocosa* it is also readily told by the yellow antennæ and very distinct venation. The coloration of the mesonotal postnotum is sufficient to distinguish *T. silinda* from *T. masai*. The three species here mentioned form a group of rather closely-related forms that are readily told by their peculiar thoracic pattern and yellow-knobbed halteres.

Tipula bartletti, sp. n.

General coloration reddish brown, the præscutal stripes nearly concolorous, narrowly margined with dark brown; scutellum and postnotum largely brown; a small, brown spot on the sides of the præscutum and on the lateral sclerites of the postnotum; wings brownish yellow, the costal region darker; fusion of M_3 and Cu_1 punctiform.

Sex?—Wing about 25 mm. Hind leg, femur 16.1 mm.; tibia 16.5 mm.

Head destroyed by pests.

Pronotum yellow, indistinctly infuscated on the sides.

Mesonotal præscutum reddish brown with four almost concolorous stripes that are narrowly margined with dark brown; median stripe narrowly split by

a capillary dark brown line; interspaces dark; lateral margins obscure yellow; a small, brown spot on the lateral margin opposite the anterior end of the lateral stripes; scutal lobes brown; scutellum brown, the lateral wings paler; postnotum with the median sclerite largely uniform brown, the lateral margins narrowly, the posterior margin more broadly, pale; lateral sclerites of postnotum with an ill-defined brown spot near the centre. Pleura obscure unicolorous yellow. Halteres broken. Legs with the coxæ and trochanters obscure yellow; femora light brown, the tips rather narrowly blackened; tibiæ brown, the tips narrowly and indistinctly darkened; tarsi dark brown. Wings with a strong brownish yellow tinge, the costal and subcostal cells more saturated; basal deflection of R_{4+5} and *r-m* indistinctly seamed with darker; *Cu* and its branches likewise seamed with darker; veins dark brown. Venation: *Rs* shorter than R_{2+3}; petiole of cell M_1 a little longer than *m;* fusion of M_3 and Cu_1 very slight.

Abdomen reddish brown, the tergites with indistinct lateral stripes; apex of the abdomen broken.

Habitat.—Madagascar.

Holotype.—Sex?, Ekongo, South-western Madagascar, (E. Bartlett) B. M. No. 78–58.

Type in the collection of the British Museum (Natural History).

Tipula victoria, sp. n.

Closely allied to *T. zambeziensis;* size larger, wing over 19 mm.; ninth tergite of the male hypopygium produced caudad into a short, broad, median lobe whose posterior margin is gently concave, the lateral lobes neither conspicuous nor divergent.

Male.—Length 20–21 mm.; wing 19.5 mm.

Female.—Length about 21 mm.; wing 19.5 mm.

Generally similar to *T. zambeziensis* Alexander, differing as follows: Size larger; brown seams along the deflection of R_{4+5} and *r-m* more extensive and distinct; stigma dark brown. In the allotype veins M_3 and Cu_1 are fused for a considerable space, but in the type male this fusion is punctiform. The female has a rounded dark brown spot on the lateral margin of the præscutum, but otherwise the mesonotum is quite unmarked with darker as in this group of species. The wings of the female are darker than those of the male, with a large obliterative area before and a somewhat smaller spot beyond the stigma. Male hypopygium with the ninth tergite extensive, the median area produced caudad into a short, broad, depressed or slightly hollowed-out lobe whose posterior margin is rather deeply concave, the lateral lobes short and not divergent as in *T. zambeziensis.* Ninth sternite profoundly incised medially as in the *zambeziensis* group of species, the notch extending almost to the eighth sternite; at the base of this notch are two parallel pencils of stiff, erect bristles, directed caudad; in *zambeziensis* these bristles are less conspicuous and tend to be decussate apically.

The female is considerably darker than the male, but for the time being, at least, must be considered as belonging to this same species.

Habitat.—Uganda.

Holotype.—♂, Mabira Forest, Chagwe, altitude 3,500–3,800 feet, July 16–25, 1911, (S. A. Neave). B. M. No. 1913–140.

Allotopotype.— ♀.

Type in the collection of the British Museum (Natural History).

Tipula milanjensis, sp. n.

Allied to *T. zambeziensis;* general coloration bright orange-yellow; thorax unmarked with darker; abdomen with a narrow, blackish subterminal ring; antennæ of male moderately elongated; wings nearly hyaline, iridescent, stigma dark brown.

Male.—Length about 20 mm.; wing 19.3 mm.

Hind leg, femur 13.8 mm.; tibia 15 mm.; metatarsus about 24 mm.

Frontal prolongation of head moderately long, orange-yellow; nasus long; mouth-parts and palpi obscure yellow. Antennæ rather long, if bent backward, extending about to the base of the halteres; scape orange; flagellum light brown, the distal segments darker brown; segments elongate-cylindrical, the verticils about as long as the segments that bear them. Head orange yellow.

Mesonotum orange-yellow without distinct darker markings; scutellum and postnotum paler yellow. Pleura yellow. Halteres brownish yellow, the knobs dark brown. Legs with the coxæ and trochanters light orange-yellow; femora pale brown, the bases still paler, the tips rather broadly blackened; tibiæ dark brown, the tips narrowly and indistinctly blackened; tarsi dark brownish black; tarsi very long and slender; claws toothed. Wings nearly hyaline, iridescent, the subcostal cell slightly darker; stigma dark brown, conspicuous; an indistinct brown cloud at the deflection of R_{4+5} and *r-m*, and another at the wing-margin at the end of vein Cu_2. Venation: *Rs* short, almost straight; fusion of M_3 and Cu_1 slight.

Abdominal tergites brownish orange, the basal tergites bright orange, segments three to six brownish orange; a narrow, subterminal black ring, including most of segment seven and segment eight with the exception of a narrow, orange-brown caudal margin; hypopygium brownish orange. Male hypopygium with the sclerites fused into a continuous ring as in this group of species. Ninth tergite extensive, the median area produced caudad into a broad, flattened lobe, the caudal margin of which is provided with a low,U-shaped notch, the lateral lobes and margin quite unarmed with spinules. Outer pleural appendage rather narrow, tapering to the subacute tip, pale, the surface covered with comparatively short setæ; inner pleural appendage produced into an inner blade that juts toward the ninth tergite, the proximal face covered with numerous short hairs; the outer margin is provided with a very powerful black spine and a small, apical flattened blade. Ninth sternite with a broad and profound median notch, the base of this incision almost coincident with the posterior margin of the eighth sternite; base of the notch broad, provided with two flattened sheaths of long, reddish yellow bristles, their tips decussate. Eighth sternite unarmed.

Habitat.—Nyasaland.

Holotype.—♂, Mt. Mlanje, December 28, 1912, (S. A. Neave).

Presented by the Entomological Research Committee 1913–236.

Type in the collection of the British Museum (Natural History).

Tipula hova, sp. n.

Allied to *T. zambeziensis;* general coloration bright orange-yellow, the

thorax unmarked with darker; male hypopygium with the median lobe of the ninth tergite short, the caudal margin with a broad, U-shaped notch.

Male.—Length 22 mm.; wing 21.5 mm. Hind leg, femur 12.1 mm.; tibia 14.6 mm.

Female.—Length 26 mm.; wing 18.5 mm.

Head and frontal prolongation clear light yellow; rostrum and palpi pale brown. Antennæ with the scape yellow; flagellum light brown, the basal swellings indistinctly paler, brownish yellow.

Mesonotum orange-yellow, the præscutum and scutum with the usual three stripes lacking or barely indicated; scutellum and postnotum clearer yellow, unmarked. Pleura clear orange-yellow, unmarked. Halteres light brown, the base of the stem narrowly light yellow. Legs with the coxæ and trochanters orange-yellow; femora yellowish brown, the tips broadly blackened; tibiæ light brown, the tips scarcely darkened; tarsi brown; claws toothed. Wings brownish subhyaline, cell *C* more yellowish, cell *Sc* more brownish; stigma brown; very indistinct seams along *r-m* and the basal deflection of Cu_1; veins dark brown. Venation: as in the subgenus; fusion of M_3 and Cu_1 punctiform.

Abdomen with the basal tergites orange-yellow, the basal third of the intermediate segments paler yellow and destitute of pubescence; segments six to nine more yellowish brown; a conspicuous, interrupted, brown, lateral stripe on tergites two to four. In the female, the dark lateral stripe is more extensive. Male hypopygium as in the *zambesiensis* group but rather more enlarged than usual. Ninth tergite with the median lobe short, the caudal margin with a broad and deep U-shaped notch, the lateral lobes rather slender, lying subparallel; viewed from the side, appearing as conspicuous flattened blades. Outer pleural appendage pale yellow, elongate-oval, the apex obtusely rounded, the outer face of the lobe with sparse bristles, longer and fringe-like at the apex. Inner pleural appendage moderately complicated in structure, consisting of an inner blade that juts against the ninth tergite, the proximal face densely clothed with long, yellow hairs, and an outer blade that bears a somewhat oval area of about a score of erect, black, spinous bristles; between these two blades lies a slightly curved, cylindrical arm with the apex truncated and heavily chitinized. Ninth sterno-pleurite with a broad and very deep V-shaped median notch that is deeper than in any other species of this group so far made known, the base lying underneath the caudal margin of the eighth sternite; beneath this profound incision is a membranous tissue, at about mid-length of the split with two contiguous flattened lobes, each fringed with a sheath of reddish bristles that are directed caudad, these longest proximally, decreasing in length outwardly. Ovipositor with the tergal valves very slender, straight; sternal valves compressed, the tips obtuse.

Habitat.—Madagascar.

Holotype.—♂, (W. D. Cowan). B.M. No. 80–45.

Allotype.—♀, Region south-east of Fort Dauphin, December, 1900. (Ch. Alluaud).

Paratopotype.—♂.

Paratypes.—♂, Ambohimitombo Forest, November, 1894. (Dr. Forsyth-Major); ♂, Tamatave, 1906, (A. Sauzier). B. M. Nos. 98–46, 1906 291; 6 ♂ ♀'s, Forêt e d'Andrangoloaka, Imerina, 1891, (A. Grandidier).

Type in the collection of the British Museum (Natural History); allotype in the collection of the Paris Museum.

The specific name, *hova*, is that of the natives inhabiting the central provinces of Madagascar.

Tipula meliuscula, sp. n.

Antenal scape yellow, flagellum indistinctly bicolorous; head cinnamon-brown with a conspicuous, dark brown, median stripe; præscutum brown with four obscure yellow stripes; remainder of the mesonotum dark brown and yellowish; pleura obscure yellow, a brown spot between the fore and middle coxæ; wings grayish subhyaline, the deflection of Cu_1 conspicuously seamed with dark brown; male hypopygium with the ninth tergite short, the caudal margin with two widely-separated rounded protuberances.

Male.—Length 15 mm.; wing 17 mm.

Frontal prolongation of the head dark brown above, more yellowish on the ventral half; palpi dark brown. Antennæ with the scape yellow; flagellum brown, the basal enlargement of each segment dark brown, the remainder slightly paler; the first scapal segment bears numerous rather short bristles on the outer face and a group of three larger bristles on the inner face, arranged in a transverse row before the tip; flagellar verticils elongate. Head rich cinnamon-brown, the vertex and occiput with a conspicuous, dark brown median stripe.

Pronotum obscure brownish yellow, darker brown on the sides. Mesonotal præscutum brown with four narrow, obscure brownish yellow stripes that are margined with darker brown; lateral margins of the sclerite in front of the pseudosutural foveæ narrowly blackened; scutal lobes brownish black, the centres indistinctly yellowish; scutellum pale testaceous, the posterior margin weakly infuscated; lateral wings of the scutellum brownish black; postnotum with the median sclerite largely dark brown, the posterior third, a median blotch near the base and the lateral margins pale; lateral lobes of the postnotum brownish black, the ventro-cephalic portion yellowish. Pleura obscure yellow with a brown spot near the dorsal margin of the mesosternum immediately behind the fore coxa; mesepisternum slightly infuscated. Halteres dark brown, the extreme base conspicuously yellowish orange. Legs with the coxæ obscure yellow, the outer faces of the fore and middle coxæ slightly infuscated; trochanters yellow; remainder of the legs broken. Wings grayish subhyaline; cell *C* light yellow, cell *Sc* pale brown; a brown spot before the arculus; stigma narrow, dark brown; conspicuous brown seams at the deflection of R_{4+5} and *r-m* and along the deflection of Cu_1; obliterative areas before the stigma in cell *1st* R_1 and beyond the stigma in the base of cell R_2. Venation: *Rs* short, straight, about equal to R_{2+3}; petiole of cell M_1 a little shorter than *m*; fusion of M_3 and Cu_1 short.

Abdominal tergites brownish yellow, the basal segments brightest, the lateral margins of the tergites narrowly dark brown; sternites generally similar to the tergites. Male hypopygium with the ninth tergite short, the caudal margin with two rounded protuberances that are widely separated, the space between appearing as a broad, U-shaped notch; these protuberances are minutely roughened. The outer pleural appendage is small and slender, provided with long hairs; inner pleural appendage with the caudal basal angle produced caudad

into a flattened spatulate blade whose apical portion is very thin, narrowly blackened and minutely denticulate.

Habitat.—Sierra Leone.

Holotype.—♂, November, 1904, (Major F. Smith). B. M. No. 1904–347.

Type in the collection of the British Museum (Natural History).

Tipula alphaspis nyasæ, subsp. n.

Female.—Length about 30 mm.; wing 25.4–26 mm.

Closely related to typical *alphaspis* Speiser (East Africa) differing as follows: Mesonotal præscutum light yellow, the three stripes grayish brown, heavily margined with dark brown; the broad median stripe split by a median brown vitta that becomes obsolete behind; scutal lobes similar to the præscutal stripes, heavily margined with dark brown; scutellum yellow, the lateral wings dark brown; postnotum light yellow with two indistinct brownish lines near the sides of the median sclerite; typical *alphaspis* has this sclerite brown with an orange-yellow median line. Pleura bright yellow. The ovipositor with the valves long and straight, the tergal valves very slender, the sternal valves more compressed. The claws of the female are simple as in this sex of the present group of species.

Habitat.—Nyasaland.

Holotype.—♀, Mt. Mlanje, January 1, 1913, (S. A. Neave).

Paratopotype.—♀, January 28, 1913; a broken ♀, bred from the pupa, November 6, 1913.

Presented by the Entomological Research Committee 1913–236; Imperial Bureau of Entomology 1915–58.

Type in the collection of the British Museum (Natural History).

Tipula leonensis, sp. n.

Size large (wing of male over 25 mm.); generally similar to *T. gaboonensis* but smaller; mesonotum with dark brown spots on the sides of the præscutum and postnotum; abdominal segments dark brown, the intermediate tergites with yellowish basal areas on the sides; male hypopygium with the ninth tergite produced into a median lobe which is shallowly notched medially.

Male.—Length 23 mm.; wing 26.5 mm.

Frontal prolongation of the head light orange; mouth-parts and palpi dark brown; tips of the latter broken. Antennæ with the scapal segments bright orange; flagellum dark brown; antennæ short; flagellar segments with very long, conspicuous bristles. Head orange, the vertex narrowed between the large eyes.

Mesonotal præscutum obscure yellow with four dark brown stripes, intermediate pair narrowly separated from one another by a capillary line; lateral stripes broad; on the sides of the præscutum opposite the anterior ends of the lateral stripes, a large, rounded dark brown spot; scutum yellow, each lobe with two confluent, dark brown spots on the anterior proximal half; scutellum dark; postnotum dark brown, the lateral sclerites obscure yellowish, the centres with a very large, rounded brown area. Pleura yellow. Halteres dark brown. Legs with the coxæ and trochanters dull yellow; femora and tibiæ brown, the tips scarcely darkened; tarsi long, dark brown; claws of the

male toothed. Wings with a strong brownish tinge, costal cell more yellowish, subcostal cell dark brown; stigma elongate, dark brown; narrow brown seams along *r-m* and the deflection of R_{4+5} and another along the basal deflection of Cu_1; a brown spot at the region of the arculus. Venation about as in other members of this characteristic group of species; *Rs* short, about equal to R_2; cell R_2 very narrow, its inner end pointed; cells *1st* M_2 and M_1 large; petiole of cell M_1 short, subequal to *m;* fusion of M_3 and Cu_1 about one-half of *r-m*.

Abdomen discoloured; apparently dark brown, the lateral basal portions of tergites two to five yellowish; tergites six to eight uniformly dark; sternites somewhat similar; hypopygium yellowish. Male hypopygium with the ninth tergite produced medially into a broad lobe, the apex of which is provided with a rather small, V-shaped notch, the lateral lobes inconspicuous; the apex of this median lobe is broadly blackened and the entire tergite, except the base, is covered with numerous, subappressed, yellowish hairs; viewed laterally, each lateral lobe is seen to be produced ventrad into a minute blackened tooth. Outer pleural appendage broadly circular in outline, pale, a little darker near the base, the surface covered with a dense, appressed, silken pubescence of a yellow colour and a lessser number of coarse, black hairs. Inner pleural appendage not jutting conspicuously caudad as in *T. gaboonensis*. Ninth sternite narrowly but profoundly incised on the median line, near the dorsal proximal angle with numerous long reddish setæ. Eighth sternite unarmed.

Habitat.—Sierra Leone.

Holotype.—♂, collected by W. G. Clements, No. 93–20.

Type in the collection of the British Museum (Natural History).

Tipula leonensis is closest to *T. gaboonensis* Alexander (Gaboon to Southern Nigeria) but differs sufficiently in the smaller size, the different pattern of the thorax, such as the increased size of the lateral spots on the præscutum and postnotum, and, especially, the structure of the male hypopygium.

Tipula ellioti, sp. n.

General coloration orange-yellow, the præscutum and scutum with grayish brown stripes that are narrowly margined with still darker brown; a small brown spot on the lateral margin of the præscutum; abdomen yellow and black; male hypopygium with the median lobe of the tergite very broad, depressed, the caudal margin gently concave; pleural appendage very complicated in structure.

Male.—Length 20 mm.; wing 22 mm.

Frontal prolongation of the head moderately elongate, orange-yellow, the nasus slender; mouth-parts and palpi dark brown. Antennæ with the scape yellow, the flagellum brownish black. Head orange-yellow.

Thorax orange-yellow, the mesonotal præscutum with three dark grayish brown stripes that are narrowly marginal with still darker velvety-brownish black; anterior half of the median stripe split by a blackish line; a very small, rounded brown spot on the sides of the præscutum opposite the anterior ends of the lateral stripes; sides of the pronotum with an indistinct darker spot; scutal lobes grayish brown margined with darker, the median area broadly yellow; scutellum yellow, the lateral portions darker; the juncture between the scutellum and lateral sclerites of the postnotum dark brownish black; postnotum yellowish

with a pale brown blotch on either side of the median sclerite, the lateral sclerites unmarked. Pleura orange-yellow. Halteres brown, the base of the stem yellowish. Legs with the coxæ orange, the outer face of the fore coxæ slightly infuscated; trochanters orange; remainder of the legs broken. Wings with a grayish tinge, cell *C* faintly yellowish, cell *Sc* more strongly so; stigma brown; a brown seam along the basal deflection of Cu_1; veins dark brown. Venation: *Rs* almost straight, much longer than R_{2+3} and not in alignment with it; petiole of cell M_1 a little shorter than *m;* fusion of M_3 and Cu_1 punctiform.

Abdomen with the basal tergites narrowly blackish laterally, less distinctly darkened medially; fourth to sixth tergites brownish yellow, the lateral margins broadly black except at the base, the median area with an elongate black triangle with the point directed backwards; seventh and eighth tergites black; hypopygium reddish yellow; sternites uniformly yellowish, the seventh sternite with the posterior lateral angles blackened; eighth sternite medially at the base and laterally at the outer angles, blackened. Male hypopygium with the sclerites fused into a continuous ring as in the subgenus; median lobe of the tergite very broad, depressed, the caudal margin gently concave and set with numerous small blackened spicules; the sides of this lobe are provided with long yellowish bristles that are longest at the posterior lateral angles of the tergite. Pleural suture well indicated beneath; pleural appendages united into a single highly-complicated structure; what seems to correspond to the outer pleural appendage is a bifid lobe with the arms densely hairy; the inner appendage is produced into an outer chitinized spine, and intermediate flattened blade and an inner powerful compressed arm that juts toward the ninth tergite and corresponds to this inner blade in less specialized species; the inner face of this blade is covered with numerous, short bristles; the cephalic apex is rounded. Ninth sternite with only a shallow median notch, the remainder of the median area being filled with a pale membrane; proximo-caudal angles with a coarse pencil of reddish bristles that are decussate across the median line. Eighth sternite unarmed.

Habitat.—Uganda.

Holotype.—♂, Salt Lake to Wawamba (G. F. Scott Elliot) No. 95–41. Type in the collection of the British Museum (Natural History).

Tipula ellioti bears a general resemblance to *T. kenia*, but is a very different fly. It is named in honour of its collector, the distinguished Botanist, Dr. G. F. Scott Elliot.

Tipula kenia, sp. n.

General coloration orange-yellow, the mesonotal præscutum with three broad, shiny black stripes; scutal lobes largely black; male hypopygium with the median lobe of the tergite short and with a small, rounded median notch.

Male.—Length about 15 mm.; wing 17.2 mm. Hing leg, femur 11.5 mm.; tibia 13.5 mm.

Female.—Length about 20 mm.; wing 18.8 mm.

Frontal prolongation of the head obscure yellow, moderately long; palpi dark brown. Antennæ with the scapal segments obscure yellow, the flagellum broken. Head orange-yellow.

Pronotum orange-yellow. Mesonotal præscutum yellow with three con-

spicuous, shiny black stripes, the lateral stripes anteriorly subcontiguous with the median stripe; scutum yellow, the lobes largely shiny black; scutellum and postnotum light yellow. Pleura yellow; an obscure brownish area beneath the wing-root and surrounding the base of the halteres; mesosternum faintly brownish. Halteres long and slender, dark brown. Legs with the coxæ and trochanters reddish yellow; femora obscure yellow, the tips black; tibiæ brown, the tips narrowly dark brown; tarsi dark brown. Wings with a grayish yellow tinge, the costal cell light yellow, the subcostal cell a little darker; stigma elongate, medium brown; veins dark brown. Venation as in the subgenus; *m-cu* present.

Abdomen with the basal tergites yellowish, longitudinally striped medially and less distinctly laterally with jet-black, these three lines narrowly connected across the caudal margin of the segments; segment five largely black, the tergite narrowly, the sternite more broadly, reddish at the base; segments six and seven black, excepting the extreme base; segment eight reddish, the tergite darker laterally and with a narrow, clear-cut median line, the sternite broadly darkened laterally and medially; hypopygium bright orange. Male hypopygium with the sclerites fused into a continuous ring; tergal region very narrow, the median area slightly produced caudad and with a rounded median notch, the blunt lateral lobes thus formed directed slightly proximad and densely set with short, blackened spinules. Outer pleural appendage rather narrow, narrowed at the base and apex, the latter bluntly rounded, the outer face of the appendage sparsely provided with moderately long bristles; inner pleural appendage moderately complicated in structure, divided into two arms, the cephalic arm compressed into a blade, the posterior arm more slender. Ninth sternite with a deep median incision filled with membranous tissue, the caudal proximal angles provided with a brush of long hairs. Eighth sternite unarmed.

Habitat.—East Africa.

Holotype.—♂, South-eastern Slopes of Mt. Kenia, British East Africa, altitude 6,000–7,000 feet, February 3–12, 1911, (S. A. Neave).

Allotype.—♀, Mt. Rungwe, near New Langenburg, ex-German East Africa, altitude 5,000–6,000 feet, November 18–21, 1910, (S. A. Neave).

Type in the collection of the British Museum (Natural History).

The female that is referred to this species has the antennal flagellum black; the median præscutal stripe narrowly split behind by a capillary pale line; the subterminal abdominal segments are narrowly ringed basally with obscure yellowish; seventh tergite yellow, narrowly but conspicuously margined laterally and caudally with black; ovipositor with the tergal valves very slender and divergent as in this group of species, the sternal valves much shorter and compressed.

Tipula neavei, sp. n.

Head orange; general coloration deep velvety-black, including the postnotum; sides of the scutellum and a large circular area surrounding the base of the halteres pale yellow; legs brownish black; wings subhyaline, the costal and subcostal cells scarcely darkened.

Female.—Wing 16.2 mm. Middle leg, femur 10.5 mm.; tibia 10.8 mm.

Frontal prolongation of the head light orange, nasus slender, with long

black hairs; mouth-parts and palpi dark brown. Antennæ with the scape orange; flagellum dark brownish black; flagellar segments slender, elongate-cylindrical, with long verticils. Head orange; vertex between the eyes more brownish.

Pronotal scutum dark brownish black; scutellum paler. Mesonotum deep velvety black, the præscutum narrowly margined anteriorly with pale yellow; lateral wings of the scutellum whitish. Mesonotum covered with an abundant, short, subappressed pubescence. Pleura deep black, the dorso-pleural membrane buffy-yellow; a large, circular, pale yellow area surrounding the base of the halteres. Halteres dark brown, the base of the stem narrowly pale. Legs with the outer faces of the coxæ blackened; trochanters yellowish testaceous; femora dark brownish black, paler basally; tibiæ brown, the tips darker; tarsi brownish black. Wings subhyaline, the costal and subcostal cells scarcely brighter; stigma elongate, brown; veins dark brownish black, slender but clearly defined; an obliterative area before the stigma, continued across the basal deflection of M_{1+2} and the outer deflection of M_3. Venation: *Rs* moderately long, slightly arcuated at origin, a little shorter than R_{2+3}; deflection of R_{2+3} and *r-m* in alignment; *m-cu* obliterated by the very short fusion of M_3 and Cu_1.

Abdomen broken, only the terminal six segments preserved, the fourth to seventh deep velvety-black, the eighth and ninth reddish horn colour. Ovipositor with the tergal valves slender, curved slightly ventrad; sternal valves much shorter, the apices obtusely rounded.

Habitat.—Uganda.

Holotype.—♀, Ankole-Toro Border, east of Lake George, altitude 4,500 feet, October 20–21, 1911, (S. A. Neave).

Presented by the Imperial Bureau of Entomology, 1915–57.

Type in the collection of the British Museum (Natural History).

The opaque black mesonotum without markings and clothed with an abundant, nearly appressed pubescence, gives this handsome fly a very characteristic appearance.

Tipula ruwenzori, sp. n.

General coloration black; head orange-red; mesonotal præscutum shiny yellow with three very broad, black stripes; postnotum light yellow; abdomen brownish black.

Female.—Length 18 mm.; wing 16.8 mm. Fore leg, femur 9.8 mm.; tibia 11.4 mm. Hind leg, femur 11.1 mm.; tibia 12.8 mm.

Somewhat similar to *T. neavei* but readily distinguished as follows: Antennæ shorter. Mesonotal præscutum shiny yellow with three broad, shiny black stripes, only the narrow interspaces and the humeral and lateral margins being of the ground colour; scutum and scutellum entirely black; postnotum with the median sclerite conspicuously light yellow, the extreme caudal margin narrowly darkened. Pleura entirely dark brown, the mesepimeron with an indistinct yellowish cast. Wings slightly more brownish, especially the costal and subcostal cells; veins with short but conspicuous macrotrichiæ. Venation: section of vein M_{1+2} between *r-m* and *m* strongly arcuated; petiole of cell M_1 about equal to *m*; fusion of M_3 and Cu_1 very slight, less than one-half *r-m*.

Abdomen dark brownish black, without definite marks of paler, the genital segment and ovipositor reddish horn-colour.

Habitat.—Uganda.

Holotype.—♀, Mt. Kokanjero, Southwest of Elgon, altitude 6,400 feet, August 9, 1911, (S. A. Neave). B. M. No. 1913–140.

Paratype.—♀, Ruwenzori, altitude 6,000–8,000 feet, December (G. F. Scott Elliott). B. M. No. 95–41.

Type in the collection of the British Museum (Natural History).

Tipula ruwenzori ankolensis, subsp. n.

Very close to the typical variety described above, differing as follows: Vertex with a conspicuous brown mark adjoining the inner margin of the eye; mesonotal præscutum almost entirely black, the yellow interspaces being greatly reduced or obliterated; postnotum with a large brownish spot on either side near the caudal margin; a yellowish spot on the dorsal portion of the mesosternum between the fore and middle coxæ. Abdominal sternites two to four with a large, obscure orange blotch, not evident in the paratype.

Habitat.—Uganda.

Holotype.—♀, Western Ankole, altitude 4,500–5,000 feet, October 10–14, 1911, (S. A. Neave).

Paratopotype.—♀.

Type in the collection of the British Museum (Natural History).

DR. W. J. HOLLAND ON "THE CANADIAN ENTOMOLOGIST."

At the meeting of the Entomological Society of America, held at St. Louis, Mo., on the 30th of December, 1919, Dr. W. J. Holland, Director of the Carnegie Museum, Pittsburg, Pa., delivered the annual address. His subject was "The Development of Entomology in North America." At the close of his interesting address, he thus referred to the "Canadian Entomologist":—

"In these times of strife and discord it is a pleasure to recall how fraternal have been the relationships which have been maintained by all workers in our special field of inquiry. I desire especially to emphasize the cordial relationships which have been maintained during all these years between students living south of the St. Lawrence with those living north of that river. One of the best of all the entomological journals on the Continent is the "Canadian Entomologist." As it is one of the oldest, so it is one of the best-sustained publications of its kind. "The Entomological Society of Ontario" is a splendid organization, in which most of the leading workers within the United States have felt it an honor to have membership. For all practical purposes the entomologists of British North America and the United States form one united brotherhood. Behold how good and pleasant it is for us thus to dwell together in unity! May I not express the hope that the friendly relationship which has so long been maintained among us may remain indissoluble, and the same spirit which has prevailed between these two great bodies of workers in the New World may extend to all brotherhoods of other nations, and that through our scientific friendships we all may help to bring in the reign of universal peace, the thought of which is dominant among us and is emphasized by the anniversary of the birth of The Prince of Peace, which we have just celebrated."

NEW SPECIES OF LEPIDOPTERA.

BY J. McDUNNOUGH.
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NOCTUIDÆ.

Agrotinæ.

Euxoa scholastica, sp. nov.

Male antennæ shortly serrate and fasciculate. Palpi, head, thorax and primaries brown, more or less suffused with pale ochreous, especially the palpi, head, bases of tegulæ and patagia and basal portion of primaries: a partial black line across the front and a better defined one crossing the middle section of the collar. Maculation of primaries very similar to that of *messoria* Harr. but better defined; basal and t. a. lines black, geminate, filled with ochreous, the latter upright, consisting of five scallops: orbicular an even, small oval, outlined with black and filled with ochreous: reniform edged with pale ochreous, especially prominent on outer margin, and filled with a shade corresponding to general colour of wing; median shade fairly distinct, bent outward along lower edge of reniform and then parallel to t. p. line; t. p. line dentate, geminate, black, inner line most prominent, ochreous filled, scarcely bent in below cell; s. t. line irregular, pale, defined inwardly by dark shades; a broken dark terminal border. Secondaries in both sexes smoky brown, slightly paler in basal half with distinct discal dot. Beneath primaries smoky, paler ochreous along costal and inner margins, with traces of postmedian line, well marked on costa, and a small discal dot; fringes concolorous; secondaries whitish, sprinkled with smoky along costa with broad bent postmedian line and dark discal dot, fringes pale, terminal broken dark line on both wings. Expanse 35 mm.

Holotype—1 ♂, Meach Lake, Que., July 24, (C. H. Young) in National Collection, Ottawa.

Allotype—1 ♀, Ottawa, Ont., Aug., 1904, (A. Gibson) in National Collection, Ottawa.

Paratype—1 ♂, Trenton, Ont., July 25, (J. D. Evans) in National Collection, Ottawa.

The species has been generally confused with *messoria* but may be most readily separated by the darker colour of the secondaries and the evenly oval, pale filled orbicular. The ♂ genitalia of the two species, of which figures are given, are closely related; in *messoria* however there is a certain amount of asymmetry between the bifid harpes, the outer branch of the left side being distinctly shorter and chunkier than the corresponding one on the right side; in the new species these are longer and subequal. The inner branch of the harpe in *messoria* is smooth with a few stray bristles whilst in *scholastica* the distal half is thickly covered with a clothing of fine short hairs. The most marked difference is in the aedoeagus as may be seen by a reference to the figures. The species appears to be widespread in the east but rather rare; specimens from New Brighton, Pa., are in the Barnes Collection and were

Contribution from the Entomological Branch, Dept. of Agriculture, Ottawa, Ont.
June, 1920

separated out several years ago, but not described as the material was scanty and not in the best of condition. The exact position of the species is doubtful, and it may be that it fits in better in the *pestula* group than with *messoria*.

Cuculliinæ.

Feralia columbiana, Sm.

This species was described (1903, Can. Ent., XXXV, 9) from two males, one from New Westminster, B.C., (Fletcher), the other labelled North West Territories from Dr. R. Ottolengui. The first mentioned specimen, which is in the collection of the U. S. National Museum, must be considered to be the type. It was originally associated by Dr. Smith with *comstocki* Grt., and has the same type of secondaries with pale shadings at base and along outer margin. On this account, after an examination of the type, it was listed in the Barnes and McDunnough Check List as a race of *comstocki*, although it may quite probably prove to be a good species. The cotype from the Ottolengui collection recently came into the possession of Dr. Wm. Barnes, of Decatur, Ill., and at the time struck me as being distinct specifically from *columbiana* as typified by the Washington specimen; the almost entirely dark secondaries pointing, to my mind, to a close relation with *jocosa* Gn. Specimens of both forms exist in the Ottawa collection, and I have prepared slides of the male genitalia and find my suspicions that two species were involved verified. The following description of the new species is therefore offered.

Feralia deceptiva, sp. nov.

Male antennæ orange: palpi deep black; front pale greenish, shaded at vertex with black: thoracic vestiture pale green marked with black at base of tegulæ and along upper margin of patagia; two anterior and two posterior black patches on mesothorax; a black patch on lower edge of patagia: metathorax with black tufts; abdomen blackish with apical segment tufted with ochreous; pectus and venter black; legs with femur covered with long greenish hairs: tibiæ black, spotted with green and with green hair tufts along outer margin. Primaries blue-green, similar in shade to *jocosa*, crossed by heavy black lines which are white-bordered; costa and cubitus to end of cell white; basal line black, edged inwardly by white, more or less joined to t. a. line along costa and inner margin, enclosing an irregular, green, kidney-shaped patch; t. a. line heavy, black, bordered outwardly with white, with strong outward scallop below cubitus, bent back to near base of wing at inner margin; median shade black, touching outer edge of orbicular, then bent back to near t. a. line and forming an outward tooth on anal vein: orbicular oval, edged with black, then with white and filled with green; below it an indistinct wedge-shaped mark indicates the claviform; reniform broad, open above and below, laterally outlined with black and white, with two black streaks extending from apex and base of outer margin half-way to t. p. line; above reniform on costa three black dots separated by white; t.p. line arising from a diffuse black costal shade, strongly bent inwards, and dentate below cell, black, bordered inwardly with white, joined to anal angle by an oblique black streak: small terminal row of black dots: fringes checkered black and white. Secondaries almost wholly black-brown with

Male genitalia of (1) *Feralia columbiana* Sm.; (2) *F. deceptiva* McD.; (3) *Euxoa scholastica* McD.; (4) *E. missoria* Harr.; (5) *Orthonama evansi* McD.; (6) *O. obstipata* Fabr.

faint pale shading at anal angle. Beneath black-brown shaded with pale greenish with an even broad, green, marginal band on primaries and a narrower irregular one on secondaries: primaries with traces of the dark lines of upper side: secondaries with large discal dot and faint median and postmedian lines; fringes as above. Expanse 42 mm.

Holotype—1 ♂, Vancouver, B.C., April 22, (Bush) in National Collection, Ottawa.

Paratype—1 ♂, Vancouver, B.C., April 16, in same collection.

Genitalically *deceptiva* is so close to the eastern *jocosa* as to almost warrant it being treated as a geographical race; on account of certain small differences in the uncus, combined with the much greater size of the insect I treat it for the present as distinct.

The species is more robust than *columbiana* and lacks the suffused dark and pale shades in the subterminal area, the secondaries are also, as already mentioned, much deeper in colour. The genitalia of the two species are of the same general type, but the armature of the aedoeagus at once separates them. I doubt whether the generic term *Momophana*, proposed for *comstocki* will hold as distinct from *Feralia:* the separation was made by Grote on the size of the eyes, but this appears to vary in individual specimens of a single species: at all events *columbiana* seems not out of place in *Feralia* on genitalic characters. I have, however, at the present time no males of *comstocki* for examination and must, therefore, leave the question of its generic position, as well as its relation to *columbiana*, open.

GEOMETRIDÆ.

Larentiinæ.

Orthonama evansi, sp. nov.

Male antennæ rather lengthily ciliate: palpi, head and thorax light ochreous sprinkled with rusty brown: abdomen ochreous with a double dorsal row of black dots. Primaries light ochreous with veins outlined in rusty brown, especially prominent in subterminal area: a broad band of purplish gray crosses the middle of the wing, broadest at costa, where it is bent somewhat outward; the inner edge is formed by an upright brown line, the outer edge is bordered by a similar line, strongly outcurved at costa and then somewhat inwardly oblique and very faintly crenulate to inner margin: a discal spot surrounded by a somewhat paler shade is situated near the inner edge. Between this median band and the base of wing are some half-dozen waved rusty-brown upright lines, the most prominent, representing the t. a. line, being geminate, white-filled and with strong outward tooth below cubitus. Beyond the median band the pale subterminal area is crossed by two crenulate brown lines, arising from a diffuse costal shade of similar colour and in course parallel to the outer margin of the band; t. p. line geminate, inner line deep brown, outer lighter, white-filled, crenulate, parallel to the preceding lines, followed by a rusty-brown shade, most conspicuous opposite cell, this shade being bordered outwardly by a crenulate brown s. t. line: terminal space shaded with light-gray with geminate black terminal points and a dark brown oblique apical dash extending from apex of wing to the brown subterminal shade. Secondaries pale with

distinct bent, smoky, median line preceded by small discal dot; a crenulate geminate t. p. line. Fringes on both wings rusty-brown in basal half, paler outwardly. Beneath pale with distinct discal dots on all wings and the extracellular maculation of the upper side repeated very distinctly, the median band being however absent. Expanse 20 mm.

Holotype—1 ♂, Trenton, Ont., June 22, (J. D. Evans) in National Collection, Ottawa.

Allotype—1 ♀, Trenton, Ont., June 15, (J. D. Evans) in National Collection, Ottawa.

Paratypes—1 ♂ Hull, Que., June 20, and 1 ♀, Trenton, Ont., Aug. 3, (Evans) in the same collection.

The species has been probably confused in collections with *obstipata* Fabr., but can be distinguished by the similarity of colour in the two sexes and by the well-defined brown veining in the subterminal area. The genitalia (which are figured) are quite distinct from those of *obstipata*. I take pleasure in naming the species after the collector, Mr. J. D. Evans, one of the pioneer entomologists of this country, whose collection is now incorporated in the Canadian National Collection.

Geometrinae.

Melanolophia centralis, sp. nov.

Very similar to *imitata* Wlk. in colour and maculation but differing obviously in ♂ genitalia. Primaries heavily sprinkled and shaded with purplish-brown over a pale ochreous base. T. a. line deep purple brown, single, with two prominent outward bulges, one in the cell, the other below cubital vein: median line similar in colour, upright, arising from small costal blotch and with rather prominent outward angle on cubitus; t. p. line indistinctly geminate, strongly scalloped, the points resting on the veins, bent in below the cell and approached to median line on inner margin, bordered outwardly by faint pale line beyond which is diffuse dark shading; small discal dot; s. t. line faint, composed of series of dark dots, subparallel to outer margin, preceded by faint pale shades, most prominent opposite cell and at inner margin: terminal area with faint dark shade opposite cell; terminal series of black points: fringes concolorous. Secondaries paler with traces of curved median and t. p. lines and distinct subterminal row of dots. Beneath pale silky grey with minute discal dots on all wings: costa of primaries and line at base of fringes slightly ochreous. Expanse 40 mm.

Holotype—1 ♂, Jemez Spgs. N.M., (Apr. 8–15) in Coll. Barnes.

Paratypes—6 ♂'s, 1 ♀, Glenwood Spgs., Colo., (May) in Coll. Barnes and in National Collection, Ottawa.

The most readily recognizable structural difference between the present species and *imitata* Wlk. is found in the male genitalia: in the latter species what may be provisionally termed the harpe is composed of a heavy bunch of subequal spines situated at the apex of the sacculus; this is modified in our new species to one very long stout spine with a few small ones gathered around its base. In connection with a study of the North American Boarmiids I hope to publish at a later date figures of the genitalia of this and allied species.

CANADIAN MYRIOPODS COLLECTED IN 1882–1883 BY J. B. TYRRELL, WITH ADDITIONAL RECORDS.

BY RALPH V. CHAMBERLIN,
Museum of Comparative Zoology, Cambridge, Man.

Among material sent to me for identification from the Canadian Geological Survey is a small collection made by J. B. Tyrrell in 1882-1883 which is of much interest in containing a new Scytonotus from British Columbia, a new Conotyla from Alberta and a new Parajulus. In addition to the forms collected by Tyrrell, some other species collected by F. Johansen in 1917 and 1918, one taken by J. A. Salter and one by R. Wells are also here listed.

CHILOPODA.

1. Geophilus rubens (Say.)

One specimen taken at Ottawa June 3, 1882, by Tyrrell.

2. Lithobius forficatus (Linné.)

Specimens taken at Ottawa in 1917 and 1918 and on St. Joseph's Id., Ontario, Sept. 3, 1918, by F. Johansen.

3. Sonibius politus (McNeil.)

One specimen taken at Ottawa, June 3, 1882, by Tyrrell.

DIPLOPODA.

4. Polydesmus serratus (Say.)

One male taken by R. Wells in 1883 on Gaspé Penninsula, Quebec, "interior," and others at Ottawa and Chelsea, summer of 1918, by F. Johansen.

5. Scytonotus columbianus, sp. nov.

At once separable from *S. bergrothi* Chamberlin, known from Bremerton, Washington, in its obviously smaller size, which approaches more nearly that of *S. granulatus* Say. As in the latter species the colour is horn brown with a tendency toward reddish. The female may be distinguished in having the keels of the eighth and ninth segments of normal size or very nearly so, not absent or nearly so. The male differs in the details of the gonopods, the anterior prong, e. g., in lateral view appearing more slender and finely tapered and curving much farther beyond the end of the posterior branch,

Fig. 16.—*Scytonotus columbianus*, sp. nov. Gonopod of male, right side, ectal view.

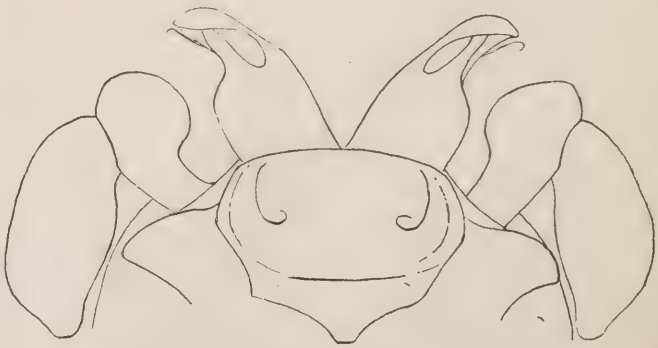

Fig. 17.—*Conotyla albertana*, sp. nov. Gonopods of male, anterior view.

which also differs in details (see fig. 16). Correlated with the normal develop-

ment of the keels of the eighth and ninth segments of the female, processes from the penult segment of legs thirteen to seventeen, etc., as occurring in *granulatus*, are absent or obsolete in the male of the present species.

Length of male type near 10 mm. The female is larger and more robust.

Locality.—British Columbia: "Columbia Valley." Male type taken by Tyrrell Sept. 26, 1883. The two female paratypes were taken by Tyrrell Sept. 1, 1883, the locality label reading simply "Swamp, tobacco plain," probably in or near the Columbia Valley.

6. Conotyla albertana, sp. nov.

Light gray brown to light brown of reddish cast, especially above. A black stripe along each laterodorsal side across keels and median dorsal longitudinal black line. Anal tergite dark, valves dusky. Legs light brown or fulvous. Antennæ all missing. Ocelli in the male type in a subtriangular patch, twenty-two in five series: thus, 7, 6, 5, 3, 1. Ocelli of a female paratype twenty in four series: thus, 7, 6, 4, 3. Second legs of female with second joint strongly thickened distad, protruding on dorsal side distally in a conspicuous rounded lobe. In the male the fourth joint of the third, fourth and fifth legs with a short cylindrical, distally truncate, lobe beneath near distal end. Sixth legs lacking lobes. Legs followed seventh segment also lacking lobes. Anal scutum truncate, with the usual setæ. Anal valves posteriorly angulate, mesally margined. Gonopods of male shown in Fig. 17.

Locality.—Alberta, Bow River, Sept. 28, 1833, Tyrrell.

Resembles *C. atrolineata* Bollman, the types of which came from Glacier, B.C., but distinct in the form the gonopods and in the secondary modifications of the legs.

7. Julus caeruleocinctus (Wood.)

One specimen taken at Ottawa in summer of 1918 by Johansen.

8. Julus fallax, (Meinert.)

One male of this European species taken by Johansen at Ottawa in Apr., 1917, and several males and females at the same place in the summer of 1918.

9. Parajulus canadensis (Newport.)

One female taken by Johansen 20 May, 1917, at Meach Lake, Ottawa.

10. Parajulus venustus (Wood.)

Two females taken on St. Joseph's Id., Ontario, by Johansen, Sept. 3, 1918.

11. Parajulus perditus, sp. nov.

The type, a female, is an exceptionally dark form. Each ordinary segment has a very narrow fulvous stripe or line along the segmental suture with a blackish annulus bordering it in front and behind, the border regions of the somite lighter, more grayish. Dorsal region on anterior segments with more numerous small lighter areolations visible under lens as frequently. In the anterior region the body is lighter beneath and on the sides, more or less reddish. The paratype from Wigwam River is lighter, being reddish gray or in part fulvous gray on the sides and beneath throughout the length, with small, in part confluent, lighter areas included in the dark of prozonite above. In both specimens the collum is marked across anterior border by a black band widening to middle where it continues caudad as a median longitudinal black line; a

black line from anterior end of the median line runs on each side obliquely caudoectad; remaining part of collum covered by a dense network of black evident under lens. Vertex of head covered with similar black network; a solid black area between eyes and antenna with pale spot at base of each antenna as usual. Anal segment blackish. Legs light reddish brown. Antennæ blackish.

Vertigial sulcus strongly marked, joining a deep arcuate transverse sulcus running between the eyes.

Collum margined below and part way up anterior edge as usual. Lower end on each side well rounded. Above lower end on each side typically three longitudinal striæ of which the uppermost extends entirely across plate to the margining sulcus and the others nearly as far. Second tergite extending below level of collum, its infero-anterior angle produced below level of the posterior; less broadly and less decidedly produced than in *P. venustus* and especially than in *P. hewitti*, two species which it resembles.

Segmental suture strongly impressed; widely curving opposite the pore, which is widely removed from it. The metazonite on each ordinary segment longitudinally striate beneath and up the side to a little below level of the pore, the more ventral striæ crossing to the prozonite, but the prozonite otherwise nonstriate. The surface in general densely marked with minute shallow punctæ and short lines as in *hewitti, venustus*, etc.

The anal tergite is produced beyond the anal valves as in *hewitti* and *venustus;* but, unlike those species, the produced part in side view is seen to bend moderately but distinctly upward, instead of being straight or slightly depressed. The tip is not rounded as in *hewitti*, being decidedly angular as viewed from above, and is broader than in *venustus*. Valves margined as usual.

Number of segments 48–52.

Length about 33 mm.; width 2.5 mm.

Localities.—Waterton Lake. Type taken Aug. 24, 1883. A second female was taken July 25, 1883, on the Wigwam River. Tyrrell coll.

12. Spirobolus marginatus (Say.)

On specimen taken at St. Nicholas, Quebec, by J. A. Salter, and one at Renfrew, Ont., by Johansen.

ENTOMOLOGICAL BRANCH—DIVISION OF FOREST INSECTS

Bark-beetle control operations are nearly completed in the Coldwater Valley, B.C., and are now being carried out in the Spious Valley. In addition to the logging operations by which the infested timber is salvaged, hundreds of infested trees, on the mountain sides and in isolated positions, have been felled and burned so as to kill the broods of beetles in the bark, The slash from all this work will be burned during June. Last week Mr. Hopping gave an open air lecture to the Dominion forest rangers at the Spious Creek camp, explaining to them, on the ground, helpful details regarding the infestation.

—Entomological Branch News Letter

Mailed June 25th, 1920.

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POPULAR AND PRACTICAL ENTOMOLOGY.

The Contents of Our Entomological Journals During 1919.

BY HARRY B. WEISS,
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Entomological journals are mostly what contributing authors make them, and the following, which is a brief summary of the 1919 contents of eight journals devoted entirely to entomology, should, if nothing else, indicate in a general way, the trend of entomological thought and activity. Such a summary, however, will not give an adequate idea of all entomological activities nor of the amount of published material devoted to each branch of entomology, in view of the fact that no consideration has been given to the publications of experiment stations, departments of agriculture, colleges and universities nor to journals devoted only partly to entomology.

The title of this paper clearly indicates its scope, and nothing more nor less should be assumed. In the tables which follow it is not intended that one journal should be compared with another. They have been treated separately only for the sake of convenience, and their contents have been summarized by titles and not by the quantities of printed matter devoted to each subject. These journals range from four to twelve issues per year, are of different sizes, and employ types of various kinds, consequently a true comparison should include all of these factors. All are valuable, all serve a useful purpose, and all should be supported by entomologists.

With the exception of Psyche and the Journal of the New York Entomological Society, the complete 1919 volume of each has been summarized. In the case of the exceptions, the last 1919 numbers of which have not appeared at this writing, the last issue of 1918 was included in order to make a complete volume.

Table I indicates the number of titles on each subject or group of subjects in each magazine. In a few instances, single papers covered more than one subject, and in such cases the titles were placed according to the amount of material on each subject. As for example, if a paper contained 75 per cent. of taxonomic material and 25 per cent. of any other subject, it was placed in the group devoted to classification. However, most of the titles and subject matter fell readily into the classification as given in the tables Table I further shows that papers on classification, including descriptions of new species and papers dealing with the various phases of systematic entomology, outnumber all others. Following this numerical order we have the biological papers, such as those dealing with the life-histories, habits and early stages of insects, and then the economic ones. Only one journal is devoted to economic entomology, and there are hundreds of economic papers published by agricultural

experiment stations, etc., so that the importance of the subject should not be measured by comparing the economic figures in Table I with the figures of other groups.

Papers on distribution, including host lists and those covering general entomology, are evidently of considerable interest to entomologists, judging by the number of titles devoted to each. The same is true for brief notes on all phases of the subject. Anatomical, morphological and physiological subjects are fairly well represented and will undoubtedly be more so in the future. Insect behaviour, ecology and origin are poorly represented, but papers on such subjects often appear in other journals, such as those devoted to animal behaviour and natural history in general.

TABLE I. NUMBER OF TITLES ON EACH SUBJECT.

Subjects	Canadian Entomologist, 12 issues.	Psyche, 6 issues.	Journal N. Y. Ent. Soc., 4 issues.	Entomological News, 10 issues	Annals Ent. Soc. America, 4 issues.	Bulletin Brooklyn Ent. Soc., 5 issues.	Proceedings Ent. Soc. Washington, 9 issues.	Journal Economic Entomology, 6 issues.	Totals.
General economic methods, insecticides, etc.								26	26
Economic entomology							1	36	37
General subject	11			9		1	1		22
Classification, descriptions, new species, etc.	42	12	17	36	10	16	26		159
Distribution, faunal and host lists	8	5	2	6	2	3	1		27
Anatomy, morphology, physiology	3	3	2		5	1	2		16
Life history, habits, early stages, etc.	8	6	3	9	6	2		10	44
Behaviour		2						1	3
Origin				2		2			4
Ecology		1							1
Brief notes, all phases	20	2	13	23	1	6	4	33	102
Proceedings societies	1		3	15	1	4		3	27
Book reviews	11		1	6		5		9	32
Obituaries	2		1	6			3		12
	106	31	42	112	25	40	38	118	512

TABLE II, NUMBER OF MAJOR AND MINOR PAPERS IN ALL JOURNALS.

	Canadian Entomologist.	Psyche.	Journal N. Y. Ent. Soc.	Entomological News.	Annals Ent. Soc. Amer.	Bulletin Brooklyn Ent. Soc.	Proceedings Ent. Soc. Washington	Journal Economic Entomology.
Major papers	72	29	24	62	23	25	31	73
Minor papers, notes, etc.	34	2	18	50	2	15	7	45
Totals	106	31	42	112	25	40	38	118

In Table II the titles are further grouped into major ones, which include all of those listed in Table III and minor ones which include everything else,

such as brief notes, book reviews, proceedings of societies, etc. Table III summarizes the major papers and gives the percentages of titles devoted to each subject. This table shows that the percentages of titles devoted to classification in the different journals ranged from 41.4 to 83.9. In nearly all of the journals more than 50 per cent. of the papers were on this subject. The percentages of titles on distribution, etc., varied from 3.2 to 17, those on anatomy etc., from 4 to 22 per cent., and those on life-history, etc., from 8 to 20.7 per cent. The remaining percentages in this table are low, except for the economic and general subjects.

TABLE III. PERCENTAGES OF MAJOR PAPERS DEVOTED TO EACH SUBJECT.

Subjects	Canadian Entomologist.	Psyche.	Jour. N. Y. Ent. Soc.	Entomological News.	Annals. Ent. Soc. Amer.	Bull. Brook. Ent. Soc.	Proc. Ent. Soc. Wash.	Jour. Econ. Ent.
General economic, methods, insecticides, etc								36
Economic entomology							3.2	49
General subject	15			14.5		4	3.2	
Classification, etc	59	41.4	71	58	43.3	64	83.9	
Distribution, etc	11	17	8	10	8.7	12	3.2	
Anatomy, morphology, etc	4	10.4	8		22	4	6.5	
Life history, habits, etc	11	20.7	13	14.5	26	8		14
Behaviour		7						1
Origin				3		8		
Ecology		3.5						
	100	100	100	100	100	100	100	100

Fifteen groups or orders of insects were treated in the major papers of all journals as shown in Table IV, with the Coleoptera leading and followed by the Diptera, Lepidoptera, Homoptera, Hymenoptera, Hemiptera and Odonata. The main orders of insects were covered in each journal. No one group was represented to the exclusion of others, however several journals showed a considerable leaning toward some particular order, probably due to the fact that most of the contributing authors to those journals were interested in such a group.

Table V is of interest in showing the locations of authors of major papers. The District of Columbia leads with a total of 63 papers in all of the magazines listed. This is due undoubtedly to the large number of federal entomologists located there. Massachusetts, New York, Illinois, New Jersey, California, Pennsylvania, Canada and Ohio follow the District of Columbia in the order named, in so far as the number of titles is concerned. Several of the journals receive papers from many states, while a few appear to be devoted mainly to contributions from one or two states, at least such was the case during 1919.

It is no secret that most of our entomological publications or journals have seriously felt the increased cost of living during the past several years ,and have had difficulty in making both ends meet This has been made public i

TABLE IV. NUMBER MAJOR TITLES ON VARIOUS GROUPS OF INSECTS.

	Canadian Entomologist.	Psyche.	Journal N. Y. Ent. Soc.	Entomological News.	Annals Ent. Soc. Amer.	Bull. Brook. Ent. Soc.	Proc. Ent. Soc. Wash.	Jour. Econ. Ent.	Totals.
Diptera	15	6	2	13	5	4	5	5	55
Siphonaptera						1			1
Hymenoptera	10	11	1	3	3	2	6	4	40
Lepidoptera	4	3	2	18	5	1	3	9	45
Coleoptera	9	4	11	5	5	5	8	12	59
Orthoptera	2	3	1	1	1	1		2	11
Hemiptera	6		1	2	1	7		1	18
Homoptera	10		4	9	2		6	12	43
Parasitica							1		1
Thysanoptera	1								1
Odonata	2	1		6					9
Trichoptera			1						1
Ephemerida	1								1
Mallophaga								1	1
Isoptera							1		1
Various groups including Acarina	12	1	1	5	1	4	1	27	52
Totals	72	29	24	62	23	25	31	73	

TABLE V. ORIGIN OF MAJOR PAPERS.

	Canad. Ent.	Psyche	Jour. N. Y. Ent. Soc.	Ent. News	Annals Ent. Soc. Amer.	Bul. Brook. Ent. Soc.	Proc. Ent. Soc. Wash.	Jour. Econ. Ent.	Total
Canada	11	1		1	1				14
Idaho								1	1
Va.								2	2
Md.								1	1
N. H.								1	1
Ariz.								1	1
Ill.	13		1	5	2	4	1	1	27
Col.	4			3				1	8
Iowa	2							3	5
D. C.	6		1	8	2	5	25	16	63
N. C.	2			1					3
Wis.	2			1	1			1	5
Mont.	1			1		1			3
Ky.	1			1				1	3
N. Y.	4	4	12	3	2	6		5	36
Mass.	7	19	3	6	4	4	3	1	47
Orc.	2			1				1	4
Ind.	3			2				4	9
Cal.	4			5	2			11	22
Ohio	2	1		4	4			3	14
N. D.	1								1
Mo.	1			2					3
N. J.	4	4	2	5	1	3		4	23
T. H.	2		1						3
Neb.			2	1					3
Conn.				1				1	2
Kan.				1				4	5
Pa.				8	3			4	15
Tex.				2				1	3
Mich.					1				1
Fla.						1	1		2
Minn.						1		2	3
Italy			1						1
England			1						1
Japan							1		1
N. Queensland								3	3

various editorials and business proceedings. In view of this it is necessary for entomologists to support their journals in a more substantial manner, and one way of doing this is to subscribe for as many as one can afford. This is a duty which entomologists owe to their science. Moreover, the charges for such subscriptions are extremely low considering present-day prices, and each journal is well worth its price and more.

In one of the publications mentioned in the tables, which is also the official organ of an association of entomologists, the statement is made that, "there were a considerable number of both active and associate members who did not subscribe for the publication." It is inconceivable that an active member of an association would refuse to support its journal. In some cases there might be extenuating circumstances, but it is believed that most entomologists can afford the small sums asked for their publications. The fact that a journal is not devoted exclusively to the entomological subject in which one is interested is not a valid excuse for failing to support it. The systematist, the economic worker, the insect ecologist, the insect biologist and the collector all need each other, and each should contribute to the other's support in order to advance the science of entomology.

A NEW SPECIES OF PSEUDACHORUTES (COLLEMBOLA).

BY CHARLES MACNAMARA,
Arnprior, Ontario.

The crystalline limestone that crops out in many places along the shores of Lac des Chats on the Ottawa River is often curiously eroded between the seasonal high and low water-marks into little circular cups with fairly vertical sides and rounded bottoms, ranging in size from about three to about eight inches in diameter by three or four inches deep. The cups occur only on horizontal surfaces, and are usually scattered in small groups rather widely separated; but occasionally a flat rock is so closely pitted with the depressions that it looks something like an enormous dilapidated honeycomb. The cups nearly always contain water, either from rain or from the splashing of the waves; and no doubt they are caused by the solvent action of water on the limestone, but why they should be so symmetrical in shape is not clear.

What concerns us here, however, is that these water-filled rock cups are great traps for some kinds of Collembola. Of course, the brisk, semi-aquatic *Isotoma palustris* Mull, which is at home on fresh-water shores all over the northern hemisphere, can leap nimbly in and out of the cups and play safely over the surface of the water. But any of the plodding Collembolan earth-walkers that blunder into the little hollows find them snares for their feet, and once caught on the water film, few of them ever seem to reach the rocky side and safety again.

So far I have collected nine different species and one variety of Collembola in the rock cups. Four are species common elsewhere in the district, but six of them—and this is what makes the cups such an interesting hunting ground—I have never found anywhere else, and of these at least two are new to science. One of the latter—a Pseudachorutes—is described in the present paper.

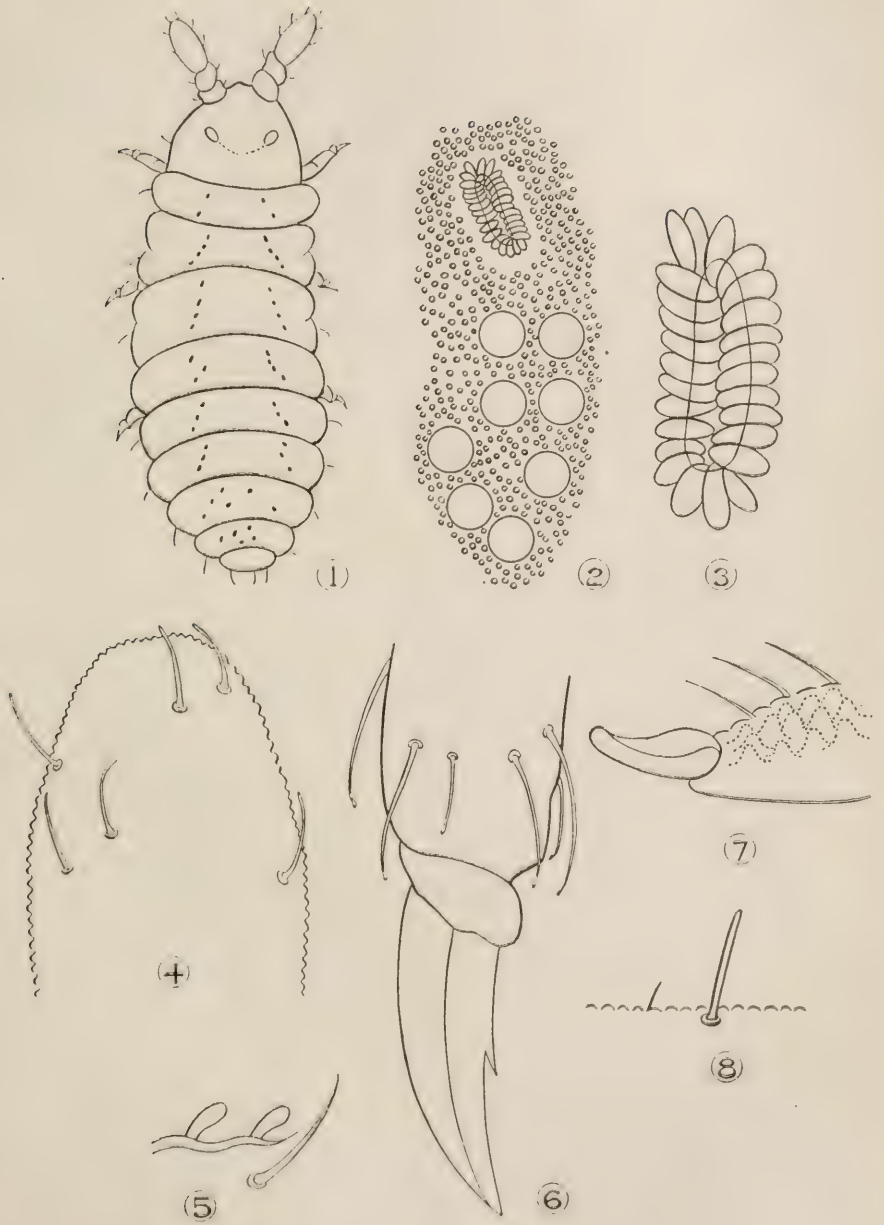
The genus Pseudachorutes, Tullberg, belongs to one of the most generalized of the Collembolan families, the Poduridæ. Including the subject of this paper, it comprises as yet only nine species, five of which are reported from Europe and four from North America. Two or three additional species have been described by different authors, only to melt away into the synonymy that is so rife in Collembolan classification. At present the genus is recorded only from the north temperate zone, but they are rare insects, and future collecting will probably discover them in other parts of the world.

The name "*saxatilis*" given the species here described, is suggested by the insect's habit of frequenting the rocks where it becomes trapped in the water-worn cups. What attraction a moisture-loving Collembolan can find on the sun-baked wind-swept limestone is hard to understand. Like many other members of its order, this Pseudachorutes seems possessed of a *wanderlust* that gets it into trouble. It does not seem possible that it can live on these bare rocks, and a careful search under stones and in crannies near the rock cups failed to discover a single individual. The fifteen or twenty specimens I have collected were all found caught on the water in the cups. The "mother lode" of this supply has not yet been traced, but it is probably among the bushes and trees a few yards back from the shore. In this respect the name is inaccurate, for the next time the insect is taken it will probably be in dead leaves or under rotten bark. But scientific names are no more to be regarded as strictly descriptive than those of persons, and no one expects to find every John Smith hammering iron on an anvil.

Pseudachorutes saxatilis, n. sp.

Plate V. Figs. 1 to 8.

Colour light to dark lavender blue, finely mottled. Body sutures, legs and under parts lighter. Dividing the width of the back into about thirds, are two rows of small light spots which diverge a little caudally on each segment (Fig. 1). *Eye-spots* conspicuously black, particularly so in the lighter-coloured specimens. *Eyes* 8+8, equal (Fig. 2). *Postantennal organ* of about 28 oval leaves arranged in a long ellipse (Fig. 3). The number of elements varies from about 25 to 29. *Antennæ* sub-equal in length with head or slightly shorter. Third and fourth segments confluent dorsally, but suture shows ventrally. Relative lengths of segments vary a good deal in different individuals, but approximate 7 : 8 : 7 : 9. First segment about 1½ times wide as long, second segment about 1¼ times wide as long, third and fourth segments taken together about 2½ times long as wide. Fourth segment furnished with "olfactory" setæ (Fig. 4). Sense-organ of two clavate curving rods situated distal dorsally on third segment (Fig. 5). Antennæ bear many single setæ, sparse on first and second segments, numerous on third and fourth segments. *Buccal cone* relatively short. *Unguis* (Fig. 6) with one large tooth about one-third from base. No tenent hairs, but distal tibio-tarsal hairs are apically bent and minutely knobbed. *Furcula* short and stout. *Dentes* with many coarse dorsal tubercles distally. *Mucrones* (Fig. 7) about one-third as long as dentes, convex in outline, with rounded lamella extending about two-thirds of the length, apical third finger-like, ventral margin curved. Rami of *tenaculum* tridentate, corpus



PSEUDACHORUTES SAXATILIS, n. sp.

without ventral setæ. *Clothing* merely a row of short, blunt simple setæ across middle of each segment with a few minute setæ in addition (Fig. 8) Maximum length 1.5 mm. Found August to October trapped on water in little cups eroded in limestone on shores of Ottawa River at Marshall's Bay, near Arnprior, Ontario.

The most distinctive feature of this species is the long, elliptical, postantennal organ of numerous elements. While these elements are usually referred to as tubercles, in this instance when viewed in plan they look like flat, overlapping plates; in perspective they are seen to be somewhat inflated, outstanding, oval leaves.

The two rows of light spots down the back may also serve for a preliminary identification, and possibly these may prove to be a constant characteristic; but coloration is so unstable with many Collembolans that little weight should be given to their presence or absence.

It is a pleasure to acknowledge the generous help that Dr. J. W. Folsom, of the University of Illinois, has given me in separating this species. His criticisms and suggestions have been of the greatest assistance, and I am indebted to him for pointing out some of the morphological niceties that the average microscopist cannot see until he is told where to look for them.

EXPLANATION OF PLATE V.

Fig. 1. *Pseudachorutes saxatilis* x45.
2. Eyes and postantennal organ of left side. x350.
3. Postantennal organ. x730.
4. Olfactory setæ of right antennæ, dorsal aspect. (Undifferentiated setæ are omitted). x450.
5. Sense organ of third antennal segment. x1500.
6. Right hind foot. x730.
7. Right mucro and part of dens. x660.
8. First abdominal segment. x500.

A NEW *MYZOCALLIS* (APHIDIDÆ: HOMOPTERA).

BY W. M. DAVIDSON,
U. S. Bureau of Entomology, Alhambra, Calif.*

Myzocallis alhambra, sp. nov.

Body non-tuberculate; wings clouded; cornicles and tibial bases pale. Alate viviparous female.

General colour pale lemon yellow, suffused with pink and light orange. Shape of body rather narrow. Antennæ slender (third joint slightly enlarged on basal half), about as long as the body, pale yellow, articulations narrowly dusky brown; joint III bears from 2 to 4 circular sensoria on basal half; filament of distal joint longer than base; relative lengths of joints: III 317, IV 233, V 250, VI 133+186; joint IV is sometimes longer than joint V, and vice versa. Head and thorax somewhat dusky on sides; forehead produced obtusely in centre, its longest hairs about one-fourth as long as the head is wide between the antennæ, obscurely capitate; beak pale yellow, tip black, reaching barely to

August, 1920.

second coxæ. Thorax and abdomen without tubercles; wings clouded brown, veins brown, insertions of wing pale yellow, stigma pale yellow, a brown spot at base; legs pale yellow, tarsi grey; sternum dusky grey. Abdomen with many grey setiferous elevated maculations, these of greatest area being on the sides of segment 2 to 4 inclusive; cornicles pale, about as broad at the base as long, narrowingly apically; cauda and anal plate pale, the latter bifid. Venter pale.

The species varies in size considerably. Length from 1.4 to 1.8 mm., width (mesothorax) from .51 to .67 mm., length of cornicles .06 to .075 mm., length of cauda .12 mm.

Host.—*Quercus englemanni* Greeul, *Quercus* sp. On the leaves.
Locality.—Alhambra, Calif.

Dates of collection.—July 7, Sept. 26, November 5, 1919.

Type.—One slide containing four alate specimens deposited in the U. S. Nat. Mus. Collection of Aphididæ.

This species differs from *Myzocallis discolor* Monell in the structure of the third joint of the antennæ, *discolor* having about 8 sensoria placed all along the segment. In Monell's species the apical half of the venter is dusky, in *alhambra* the venter is pale.

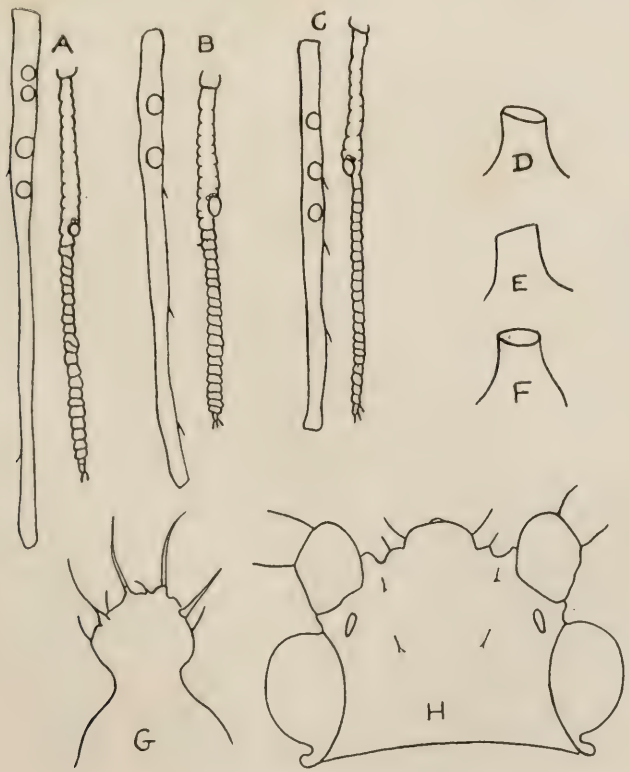


Fig. 18. A, B, C, segments III and VI of three antennæ; D, E, F, three views of cornicle; G, cauda; H, dorsum of head.

REMARKS ON THE BASIC PLAN OF THE TERMINAL ABDOMINAL STRUCTURES OF THE MALES OF WINGED INSECTS.

BY G. C. CRAMPTON, PH. D.
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The genitalia of male Hymenoptera, Neuroptera, Mecoptera, Diptera, Trichoptera, Lepidoptera, Hemiptera (Homoptera) and Strepsiptera have been compared with those of the lower orders in a paper which appeared in "Psyche," (June, 1920). The added knowledge gained from this study of a wider range of forms, and from an examination of the condition occurring in arthropods related to insects, together with the light thrown upon the nature of the parts in the lower insects in Dr. Walker's recent description of the genitalia of the male of *Grylloblatta campodeiformis* (Can. Ent., LI, 1919, p. 131) have enabled me to come to a better understanding of the fundamental composition of the terminal structures of the Hexapoda, and the following suggestions are here offered in an effort to clear up some of the uncertainties concerning the interpretation of the parts in insects in general and in the higher forms in particular.

Embryologists have maintained that the abdomen of an insect is primarily composed of twelve segments—or eleven segments, with a "telson"—and since the abdomen of the Protura (which are among the most primitive representatives of the Hexapoda) is composed of twelve segments, there is some evidence for considering that twelve is the original number of segments entering into the composition of the abdominal region of insects in general. It is only in exceptional cases, however, that traces of the structures interpreted as the vestiges of a twelfth segment are retained (as in certain odonatan nymphs), and the retention of even eleven complete segments is by no means of common occurrence in the lower pterygotan orders, since the eleventh tergite ("11^t" of Fig. 5) is usually lost through atrophy of fusion with the preceding tergites, though certain latero-ventral parts of the eleventh segment are frequently retained to form the so-called paraprocts "e" (Figs. 1 and 5) of lower insects.

The paraprocts "e" (Figs. 1 and 5) are usually much reduced, and unite with the tergites of the tenth or other segments to form the anal papilla or proctiger (a structure bearing the anus) in higher forms (Fig. 6, "h"). The paraprocts, "e", are represented as though distinct, in the diagram of the parts of a sawfly shown in Fig. 3; but this does not correspond to the actual condition occurring in any known sawfly, since the paraprocts in these insects usually form the floor (and sides) of the anus-bearing structure whose tergal region is made up largely of the tenth tergite—which usually unites more or less closely with the ninth tergite in the sawfly group.

The cerci, "f", borne on the paraprocts "e" (Figs. 1, 3 and 5) are homologous with the multiarticulate flagelliform uropods of such Crustacea as the Tanaidacea (Chelifera). The exopodite, or outer branch of the biramous appendage forming the uropod, is sometimes wanting in these flagelliform uropods of the Tanaidacea, thus suggesting that when only one of the branches is retained, the endopodite, or inner one, remains to form the cerci of insects. When both branches of the uropod are retained in the Tanaidacea, they are borne upon a single segment or protopodite (if one may judge from the published figures of these structures, and from the condition exhibited by *Apseudes spinosus*) and on this account I have been led to conclude that Walker, 1919 (Ann. Ent. Soc.

America, XII, 1919, p. 267) is incorrect in adopting the method of designating the basal segment of the cerci as the "basipodite," proposed by the German entomologists. Furthermore, it is quite possible that the paraprocts themselves (or a portion of them) represent the basal region of the uropod (see Fig. 5, "e"), whose endopodite is represented by the cerci. If this be correct, we might also consider the styli-like "paraprocessi",, or articulated processes borne on the paraprocts of certain tridactylids, as the representatives of the exopodite of the uropod whose endopodite forms the cerci of these insects.

The styli of insects apparently represent the exopodites of abdominal limbs, and if the paraprocessi also represent the exopodites of abdominal limbs (uropods) we would naturally expect that those paraprocessi would have the form of styli—as is true of the jointed paraprocessi of the tridactylids. On the other hand, the paraprocessi of certain Plecoptera are not styli-like, and the so-called suprahami (or surhami) of certain Blattida, which are somewhat suggestive of them, are not styli-like, being more like a hook—but the type of structure occurring in the Plecoptera might possibly be regarded as modifications of the original styli-like form. It may be remarked, in passing, that in some larvæ these styli have been interpreted as "cerci"; but this matter will be discussed eslewhwere.

The tenth tergite, "10^t", of Figs. 1 and 5, has been referred to as the "epiproct," or supraanal plate, when it is sufficiently well developed to be distinguishable, although the same term has also been applied to the eleventh tergite "11^t" in some cases. This is a somewhat lax application of the term epiproct, and Walker, 1919 (l. c.) is much more exact in restricting the designation epiproct or supraanal plate to the eleventh tergite. There is, however, an apparent need for some general designation for the last visible tergite no matter to what segment it belongs, and on this account I have here followed the more lax usage of referring to the apparent terminal tergite as the "epiproct" regardless of the segments involved in its make-up. In the sawflies, the tenth tergite "10^t" of Fig. 3 is usually more or less closely united with the ninth tergite, and in most higher insects it is difficult to identity its homologue. The sternum of the tenth segment is usually greatly reduced or atrophied, although it is claimed by some entomologists that the basal portion of the genital forceps "a" of Fig. 2, represents the tenth sternite in sawflies, etc. I think, however, that it is possible to interpret the structure in question in another way, as will be presently discussed. Heymons and others have maintained that lateral structures of the tenth segment form what appear to be the cerci in male Odonata, and there are sometimes present in certain phasmids, accessory lateral clasping organs which might be mistaken for cerci, though in reality they are merely posterior prolongations of the lateral region of the tergite.

Lateral portions of the ninth tergite may become prolonged posteriorly to form the surgonopods ("i" of Fig. 6) or accessory clasping organs of certain Neuroptera, Diptera and related forms, and have, in some cases, been mistaken for the true genital forceps when the latter are reduced and the surgonopods are well developed. The pleural region of the ninth segment labeled "9^p" in Fig. 6, has been homologized with the paraprocts "e" (Figs. 1, 3, 5, etc.) in certain higher insects; but the gonopleurite "9^p" of Fig. 6, is an entirely different structure, and should be designated by a term indicating this fact. The

sternite of the ninth segment is a structure of considerable interest from the fact that in the higher orders it forms the hypandrium "9^s" (Fig. 3) or ventral plate extending below the genital apparatus of the male insect, and its form and development offer features of some value in classification.

Behind the ninth sternite, or hypandrium "9^s" (Figs. 4 and 5) of the Ephemerida, there occurs a plate formed by the union of the "coxites" or styligers "a" and "a," which represent the basal segments of the gonopods or styli bearing the labels "b" and "c." The plate "a" and "a" of Fig. 4 is usually interpreted as the tenth sternite by students of the Ephemerida (Morgan, Eaton, et al.); but Handlirsch, 1913, (Handb. der Entomologie) figures the terminal structures of a male ephemerid *Palingenia*, in which the styligers of "coxites" (i. e., the parts labeled "a" in Fig. 4) are separate and distinct, and Walker, 1919 (l. c.) also points out that these "coxites" or styligers may unite to form the plate "a" and "a" behind the ninth sternite in the Ephemerida (Fig. 4). This interpretation is apparently the correct one, and has been adopted in the present discussion.

Between the styli or gonopods labeled "b" and "c" in Figs. 4 and 5 of the Ephemerida, there occurs a pair of penisvalvæ "d," through which the ejaculatory ducts open. In some insects, the common opening of the united ducts is located at or near the base of the penis valves. It is quite possible that the penis valves "d" represent the endopodites (inner branches) of a pair of abdominal limbs whose exopodites (or outer branches) are represented by the styli or gonopods labeled "b" and "c" in Figs. 2, 3, 4, etc. If this be correct, both the penis valves and the gonopods would have to be regarded as belonging to the same segment (the ninth) since they are parts of a pair of limbs borne on one segment. This interpretation has a direct bearing on the view that the inner and the dorsal valvulæ of the ovipositor of the female also represent the endopodites and exopodites of a pair of abdominal limbs, since it is quite possible that the penis valves of the male insect are homologous with the inner valvulæ of the ovipositor of the female; and the gonopods or styli of the male are homologous with the dorsal valvulæ of the ovipositor of the female insect. The penis valves of the male and the inner valvulæ of the ovipositor of the female would represent endopodites, while the styli (or gonopods) of the male and the dorsal valvulæ of the ovipositor of the female would represent exopodites of a pair of abdominal limbs borne on the ninth segment in both cases, according to this view; but Wheeler, 1893, (Jour. Morphol., VIII, p. 1) maintains that the inner valvulæ of the ovipositor, for example, are in reality styli originally borne on the tenth sternite, and are only secondarily located on the ninth sternite as the result of their migration to their final position between the dorsal valvulæ (of the ovipositor) which are located on the ninth sternite. If this be correct, the inner valvulæ of the ovipositor (and their supposed homologues, the penis valves of the male) do not originate on the same segment with the dorsal valvulæ of the ovipositor (or their supposed homologues, the gonopods or styli of the male), and therefore cannot be regarded as the endopodites of a pair of limbs whose exopodites are represented by the dorsal valvulæ (since the two branches of a biramous limb cannot originate on separate segments).

Wheeler, 1893, (l. c.) would interpret the three pairs of valvulæ composing the ovipositor of a female insect, as three pairs of modified styliform appendages

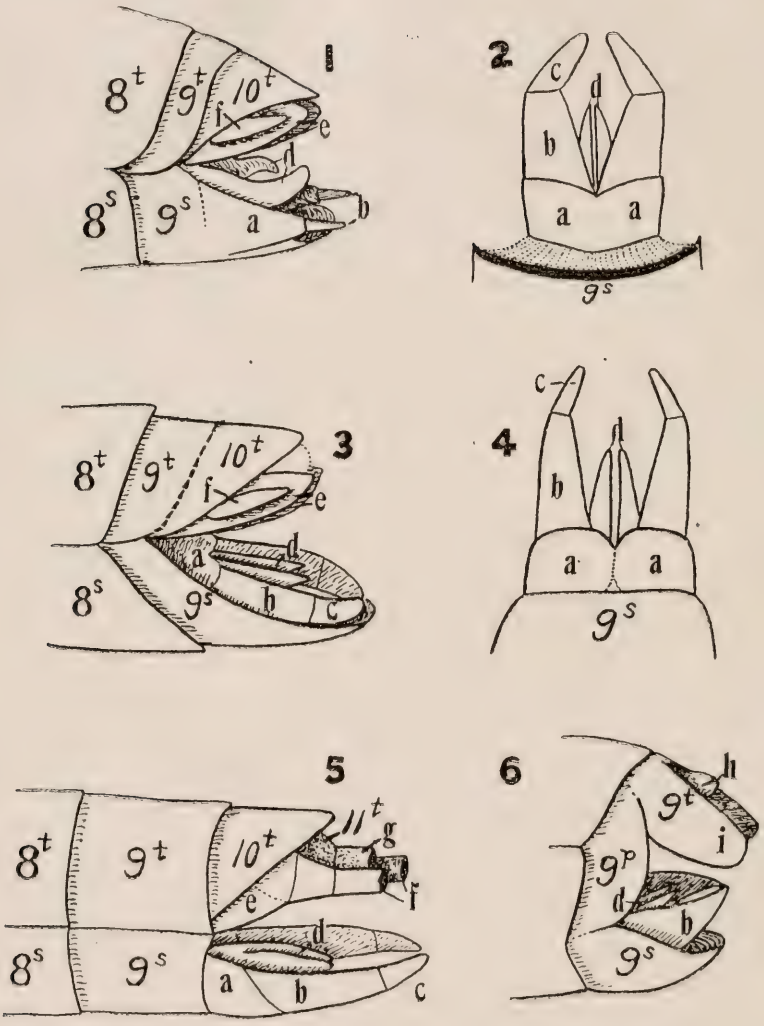
originally borne on the eighth, ninth and tenth sternites respectively, and homologizes them with paired styli borne on the eighth, ninth and tenth sternites of the male. While all three pairs of styli persist in the female (the pair originally borne on the tenth sternite migrating to a position on the ninth, in the female), only the pair borne on the ninth sternite persist in the male, the other pairs gradually disappearing as development proceeds. It must be admitted that Wheeler's choice of *Xiphidium* was an extremely unfortunate one, since the genitalia of the males of these insects are too highly modified to give the best results for such an investigation; and until the ontogenetic development of more favorable forms, such as the Ephemerida, sawflies, etc., have been studied with a view to determining the interpretation of the parts in male insects, we must conclude that the evidence available is not entirely satisfactory, especially since Heymons, Palmen, and others who have also traced the development of the parts in males of lower insects, do not agree with Wheeler in many particulars.

A study of the so-called gonopods, or arthrostyles,* borne on the ninth abdominal segment in trichopterous larvæ, has convinced me that these structures form the claspers or gonopods of adult male caddice-flies (i. e., the structures labeled "c" and "b" in Fig. 2), and since these structures are evidently appendages of the ninth abdominal segment (not of the tenth abdominal segment, as was stated in the article published in Psyche) in caddice-fly larvæ, I would interpret the outer claspers of the genitalia of the males of higher insects as appendages (styli) of the ninth abdominal segment. On the other hand, the penis valves may or may not belong to the same segment, although I am inclined to interpret them as appendages (endopodites ?) of the ninth abdominal segment also.

If the structures labeled "a" and "b" in Fig. 1 are homologous with those labeled "a" and "b" (with "c") in Fig. 5, and if these in turn are homologous with the structures labeled "a" and "b" (with "c") in Fig. 3, it is quite evident that there has been a considerable shifting of the parts in the different insects under consideration. Thus, in the roach shown in Fig. 1, the styligers or "coxites" labeled "a," instead of tending to remain more or less distinct as in the Ephemerida ("a" of Figs. 4 and 5), become more closely united with the ninth sternite "9^{st}" of Fig. 1, while the penis valves "d" are apparently attached behind the posterior border of the ninth sternite—which has either grown out posteriorly beneath them, or the penis valves have been shifted forward basally. If the structures bearing the label "d" in Fig. 1 are the homologues of the penis valves of the other insects figured, they have followed a line of specialization leading toward the asymmetrical development of the parts, and their relation to the styli or gonopods "a" and "b" is somewhat different from that occurring in the higher insects.

Another course of development has apparently been followed in the sawfly shown in Fig. 3, since the ninth sternite "9^{st}" (which does not project far posteriorly in the ephemerid shown in Fig. 5, "9^{st}") has grown outward and back-

*In the larvæ of certain sawflies such as *Neurotoma*, there occur near the base of the sternite of the tenth abdominal segment, a pair of jointed appendages which I interpreted as segmented styli (arthrostyles) from the fact that they are borne on the sternum of the segment. Mr. Middleton, however, informs me that these apparent arthrostyles are transformed into the cerci of the adult male insect, and if this be correct, the structures in question should be designated as cerci rather than as styli (or arthrostyles) in these larvæ.



TERMINAL ABDOMINAL STRUCTURES OF MALE INSECTS.

(P. 183)

ward under the structures labeled "a," "b," "c," and "d" in Fig. 5, thus bringing them into the position of the structures labeled "a," "b," "c," and "d" in Fig. 3. If the plate bearing the labels "a" and "a" in Fig. 2 of a sawfly, represents the plate labeled "a" and "a" in Fig. 4 of an ephemerid, it is quite evident that the styligers or "coxites" whose fusion product is represented by the plate bearing the labels "a" and "a" in Fig. 2, are distinctly separated from the ninth sternite "9^s" which originally bore them (?) thus presenting a condition comparable to

that occurring in the male of *Grylloblatta campodeiformis*, which Walker, 1919 (l. c.) considered to be unique among winged insects.

The relative positions of the parts in the sawfly (Figs. 3 and 2) are essentially the same as in the more primitive representatives of the higher orders of insects, such as the tipulids among the Diptera, *Philopetamus* among the Trichoptera etc., but other structure become secondarily developed in certain of these forms, thereby rendering the arrangement of the parts much more complicated and difficult of interpretation. As was described in a paper on the genitalia of male sawflies (Proc. Ent. Soc. Washington, 1919, Vol. 21, p. 129) there become differentiated from the distal portion of the segment "b" (Fig. 2) of the sawfly's gonopods, a pair of inner claspers which were interpreted as the volsellæ of higher Hymenoptera in the paper referred to above. These volsellæ-like structures probably correspond to the inner claspers of such Lepidoptera as the Geometridæ, etc. One or both of the valves of the penis "d" may form a portion of the aedeagus; and numerous other changes take place through the outgrowth of various "prongs" and other structures, through the modification of the tergites, such as the posterior prolongations of the lateral region of the ninth tergite labeled "i" in Fig. 6, etc., but these features have been more fully described in an article which will soon appear in Psyche, and need not be further discussed here.

Abbreviations.

a. Styligers or "coxites"; basal structures bearing the styli. They may unite to form a single plate or basal ring.
b. Basal segments of the styli or gonopods.
c. Distal segments of the styli or gonopods.
d. Penisvalvæ or valves of the "penis."
e. Paraprocts, or plates on either side of the anus.
f. Cerci.
g. Telofilum, or terminal filament.
h. Proctiger, or anal papilla bearing anus.
i. Surgonopods, or accessory claspers; prolongations of the ninth tergite.

The ninth sternite "9^{s}" forms the hypandrium, the ninth pleurite "9^{p}" forms the gonopleurite, and the tenth or eleventh tergite forms the epiproct. The letters t, p and s written to the right and above the numerals are used to indicate the tergite, pleurite and sternite of their respective segments.

Explanation of Plate VI.

Fig. 1. Lateral view of terminal structures of a blattid (based on *Cryptocercus*).
Fig. 2. Ventral view of genital forceps of a sawfly (based on *Sirex*).
Fig. 3. Lateral view of terminal structures of a sawfly.
Fig. 4. Ventral view of genital forceps of a mayfly (based on *Blasturus*).
Fig. 5. Lateral view of terminal structures of a mayfly.
Fig. 9. Lateral view of terminal structures of a Neuropteron (based on *Nymphes* and *Ithone*).

All figures are very diagrammatic.

ON CHILOPODS OF THE FAMILY MECISTOCEPHALIDÆ.

BY RALPH V. CHAMBERLIN,
Cambridge, Mass

While some confusion still exists in the application of the generic name Mecistocephalus Newport and consequently of the family name Mecistocephalidæ, under the rules of the International Code the problem is a simple one, and *punctifrons* Newport is clearly the type of the genus. Lamnonyx thus falls as a synonym to Mecistocephalus. In the present paper Mecistocephalus is regarded as thus unalterably fixed, and the family Mecistocephalidæ is treated broadly as including all mecistocephaloid forms

KEY TO GENERA OF THE MECISTOPHALIDÆ.

a. Coxosterna of second maxillæ discrete, not fused at middle line; palpi of second maxillæ clawless.....(Arrupinæ).
  b. Coxæ of first maxillæ discrete.....Arrup Chamberlin.
  bb. Coxæ of first maxillæ fused.....Prolamnonyx Silvestri.
aa. Coxosterna of second maxillæ united at middle line; palpi of second maxillæ with claws.....(Mecistocephalinæ).
  b. Cephalic plate with a stout spine beneath near each anterolateral corner; clypeal region divided by a distinctly areolate median longitudinal band extending from anterior areolate area; clypeal setæ few.
    c. Coxopleuræ of last pediferous segment very large, extending to or beyond the spiracle of the preceding segment.....Megethmus Cook.
    cc. Coxopleuræ of last pediferous segment of normal size, not embracing the preceding segment.
      d. Laminæ of mandibles, excepting the first, with teeth confined to distal region proximad of where they are replaced by a close line of cilia.
      Lateral pieces of labrum with margin ciliate throughout.....Dasyptyx Chamberlin.
      dd. Laminæ of mandibles with teeth throughout, no such ciliate lines.
        e. Labral margins shortly ciliate throughout; teeth of mandibular laminæ, except distally, exceedingly minute.....Brachyptyx, gen. nov.*
        ee. Labral margins either wholly smooth or setose or ciliate only for a very short distance subjacent to median angles; proximal teeth of mandibular laminæ not at all or only moderately and gradually reduced.
          f. Labral margins wholly smooth; teeth of first lamina of mandibles seven or less.....Mecistocephalus Newport.
          ff. Labral free margins with a few setæ or a short line of cilia at mesal ends subjacent to median piece; teeth of first mandibular lamina ten or more, the mesal edge of mandible serrate.....Pauroptyx, gen. nov.

*Genotype, *Mecistocephalus mirandus* Pocock (*Lamnonyx mirandus* Silvestri).

bb. Cephalic plate with no such teeth beneath; clypeal region not divided by a median areolate band, its setæ usually very numerous.

c. Free margins of lateral pieces of labrum ciliate throughout; preclypeal setæ very numerous; channel from salivary pore in coxosternum extending caudad to or near the posterior angles.....Dicellophilus Cook.

cc. Labral margins wholly smooth; preclypeal and clypeal setæ very few; channel from salivary pore in coxosternum on each side extending laterad to margin well cephalad of posterior angles as in Mecistocephalus, etc.....Tygarrup Chamberlin.

Below is given a list of the known species of Mecistocephalidæ, with localities for each. In this list the numerals in parentheses with page numbers following each name refer to the literature at the end of the present paper in which the original descriptions were published.

A List of The Mecistocephalidæ.

Mecistocephalus Newport.

M. angusticeps (Ribaut), (24), p. 23. Africa.
M. angustior Chamberlin, (9). Society Is.
M. castaneiceps Haase, (12), p. 102. Pulo Edam Is.
M. cephalotes Meinert, (18), p. 100. Java; India, etc.
M. cephalotes multispinata (Silvestri), (27), p. 61. India.
M. cephalotes subinsularis (Silvestri), (27), p. 61. Ceylon; Sumatra; Mergui; Tonkin.
M. curvidens Haase, (12), p. 104. Philippines (Bohol).
M. cyclops Brölemann, (4), p. 528. Seychelles.
M. diversidens (Silvestri), (27), p. 76. India.
M. diversisternus (Silvestri), (27), p. 81. Japan.
M. erythroceps Chamberlin (9). Fiji Is.
M. guildingii Newport, (21), p. 179. =**M. maxillaris** (Gervais).
M. gulliveri Butler, (3), p. 446. =**M. maxillaris** (Gervais).
M. hamidens Haase, (12), p. 1, 6, legend and fig. =**M. curvidens** Haase.
M. heros Meinert, (19), p. 214. =**M. insularis** (Lucas).
M. heteropus Humbert, (13), p. 19. Ceylon.
M. insularis (Lucas), (17), Annex N. Africa; India; Seychelles, etc.
M. insularis orientalis (Silvestri), (26), p. 59. India; Sumatra; Andamans
M. japonicus Meinert, (20), p. 142. Japan.
M. kurandanus Chamberlin, (9). Australia.
M. leonensis (Cook), (10), p. 79. =**M. maxillaris** (Gervais).
M. lifuensis Pocock, (24), p. 63. Loyalty Is.
M. maxillaris (Gervais), (11), p. 52. Tropicopolitan.
M. meinerti Seliwanoff, (26). Central Asia (Taschkent).
M. mimeticus Chambelrin, (9). Solomon Is.
M. modestus (Silvestri), (27), p. 68. New Guinea.
M. nannocornis, sp. nov. Phillipines.
M. nigriceps Chamberlin, (9). Fiji Is.; Solomon Is.

M. parvus Chamberlin,[1] (8), p. 85. Galapagos Is.

M. punctifrons Newport, (21), p. 179. India.

M. punctifrons glabridorsalis Attems, (1), p. 138. =**M. insularis** (Lucas).

M. rubriceps Wood, (30), p. 42. Japan; Bonin Is.; Philippines; Formosa.

M. simplex Chamberlin, (9). Australia.

M. smithi Pocock, (23), p. 351. China; Formosa.

M. spissus Wood, (30), p. 43. Hawaiian Is.

M. sulcicollis Tömösvary, (28), p. 162. Borneo.

M. tahitiensis Wood, (30), p. 43. Society Is.; Australia; New Guinea; Fiji Is.

M. tenuiculus (L. Koch), (16), p. 794. =**M. rubriceps** Wood.

M. togensis (Cook), (10), p. 39. =**M. insularis** (Lucas).

Megethmus Cook.

M. ferrugineus (Hutton), (14), p. 115. New Zealand.

M. huttoni (Pocock), (22), p. 223. =**M. ferrugineus** (Hutton).

M. microporus (Haase), (12), p. 106. Philippines (Luzon).

M. pluripes, sp. nov. Philipines.

Pauroptyx, gen. nov.

P. himalayanus, sp. nov. India.

P. pallidus (Silvestri), (27), p. 65. India.

P. superior (Silvestri), (27), p. 63. India.

Brachyptyx, gen. nov.

B. mirandus (Pocock), (23), p. 352. Japan; Formosa; etc.

Dasyptyx, gen. nov.

D. gigas (Haase), (12), p. 105. New Guinea.

D. solomonensis Chamberlin, (9). Solomon Is.

D. subgigas (Silvestri), (27), p. 70. New Guinea.

D. uncifer (Silvestri), (27), p. 72. New Guinea.

Dicellophilus Cook.

D. anomalus (Chamberlin), (5), p. 665. Western United States.

D. apfelbecki (Verhoeff), (29), p. 348. =**D. carniolensis** (C. Koch).

D. apfelbecki diversiporus (Verhoeff), (27), p. 348. =**D. carniolensis** (C. Koch).

D. breviceps (Meinert), (19), p. 214. =**D. limatus** (Wood).[2]

D. carniolensis (C. Koch), (15), p. 185. Europe.

D. limatus (Wood), (30), p. 42. Western United States.

Tygarrup Chamberlin.

T. intermedius Chamberlin, (7), p. 212. British Guiana.[3]

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1 Dr. Silvestri thinks this the same as *M. maxillaris;* but in this he is in error. As a matter of fact the two species are widely separated. Aside from differences in mouthparts, *parvus* may at once be distinguished from *maxillaris* in having the sternal impressions simple, not at all anteriorly furcate. It is a much smaller species with fuscous head and prehensors.

2 The type of *M. breviceps* Meinert is in the Mus. Comp. Zool. at Cambridge. In the old insect catalogue (No. 310), it is noted as collected on Nantucket in Aug., 1853. This record, however, is probably erroneous. Both the type and the paratype, which is without locality label, agree fully with specimens of *D. limatus* (Wood) from California.

3 Taken at Washington, D. C., in pots of plants at quarantine from British Guiana.

Prolamnonyx Silvestri.

P. holstii (Pocock), (23), p. 352. Japan; China.

P. indecorus (Attems), (2), p. 287. =**P. holstii** (Pocock)

P. santeri Silvestri, (27), p. 87. Formosa.

Arrup Chamberlin.

A. pylorus Chamberlin, (6), p. 654. California.

Description of New Forms.

Mecistocephalus nannocornis, sp. nov.

Dusky brown, the head darker, more blackish.

Head coarsely deeply punctate; exceptionally short in proportion to width, being only 1.4 times longer than wide; frontal suture very distinct as in most species, the suture bowed forward at its middle. Tooth on ventral side of anterior corner much reduced. Antennæ very short, scarcely reaching to end of first tergite.

Tergites uneven, roughened; sulci in middle and posterior regions very strongly impressed.

Prosternum proportionately short and wide, rather finely punctate; anterior margin with two low, rounded teeth. Prehensors with femuroid bearing a single tooth at distal end; second and third joints also armed; claw with tooth low and slight, almost obsolete. Sternites with a deep median longitudinal sulcus not bifurcate at its anterior end.

Last ventral plate strongly narrowed caudad, the caudal margin straight. Coxopleuræ with pores of moderate size, not crowded, about thirty on each side.

Last dorsal plate broad and shield-shaped.

Pairs of legs only forty-five.

Locality.—P. I.; Mt. Makiling. (C. F. Baker).

Type.—M. C. Z., No. 2006.

Like *spissus* Wood, occurring in the Hawaiian Is., in the number of pairs of legs; but readily distinguished by its proportionately much shorter head, etc.

Megethmus pluripes, sp. nov.

This species may be distinguished from *microporus* in the smaller coxopleuræ of the last segment which enroach upon the penult segment only as far as the spiracle, not reaching the anterior end; pores similarly very numerous and fine. Pairs of legs ninety-seven instead of one hundred and one.

General colour fulvous; head and prehensors red or light chestnut.

Head very long and narrow, being just twice as long as the greatest width. Paired sulci close together, parallel, distinct for a short distance in front of caudal margin, then becoming vague. Antennæ long; joints all long. Mandible with nine dentate plates of which the first has but three teeth and a median one near twenty of which the more proximal are more widely spaced. Median piece of labrum cuneate; lateral pieces with margin wholly smooth, mesal tooth but vaguely indicated.

Basal plate with a sharply impressed median longitudinal sulcus. Prosternum sparsely punctate; unarmed anteriorly. Femuroid of prehensors each with two stout black teeth on mesal side of which the distal one is much the larger; teeth of second and third joints black, rounded; tooth of claw very low, indistinct.

Sternites each with a deep, Y-shaped impression, the branches widely diverging, at or caudad of the middle, the angle very obtuse, the ends transverse.

Dorsal plates bisulcate from the first caudad.

Length, 75 mm.

Type—M. C. Z. 1,917; paratypes M. C. Z. 1,918. Philippines: Mr. Banahao, C. F. Baker.

Pauroptyx, gen. nov.

In this genus there is a short series of setæ or cilia on or projecting from beneath the free edge of each lateral piece of the labrum at its mesal end. The mesocaudal angle of each lateral piece of the labrum is typically more strongly produced than in Mecistocephalus. The first lamina of the mandible has from ten to sixteen teeth in the known species, the series of teeth being continued proximally by a series of characteristic serrations along the mesal edge of the mandible.

Genotype.—*P. himalayanus*, sp. nov.

The known species are all from India.

Pauroptyx himalayanus, sp. nov.

The median piece of the labrum in this species projects caudad beyond the edge of the main part of each lateral piece; each lateral piece adjacent to the median piece produced caudad into a long acute tooth somewhat like but proportionately much longer than the corresponding processes of *P. superior* and *P. pallidus*. Labrum with setæ showing at mesal end at a near angle formed by mesal process and main part of plate, these in part, at least, merely stiff hairs projecting from beneath (i. e., from dorsal surface) the edge and similar to the other hairs clothing the dorsal surface. Mandibles with nine pectinate lamellæ of which the first is ten-toothed; the inner margin below these teeth conspicuously serrate. A median lamella has about thirty-eight teeth which decrease from the distal end proximad in the usual way. Head 1.9 times, or slightly less, longer than wide. Anal legs more than twice as long as the penult. Last sternite large, more strongly narrowed caudad than in *pallidus* but similarly constricted in front of caudal end; broader in male, the caudal lobe more abruptly set off.

Colour uniform fulvous to light brown, the legs concolorous. Head and prehensorial segment abruptly darker, chestnut to mahogany. Antennæ fulvous.

Length to 60 mm.; width of first plate, 1.8 mm.

Pairs of legs, forty-nine.

Type.—M. C. Z. 899; paratypes, 897, 900, 898. India; Himalayas; Koolloo; near Amballa.

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BOOK NOTICES.

THE CRANE-FLIES OF NEW YORK. Part I. Distribution and Taxonomy of the Adult Flies. By Charles Paul Alexander. Memoir 25. Cornell University Agricultural Experiment Station. Ithaca, N. Y., 1919. Pp. 769-993; with 6 plates and 11 text figures.

It has been heretofore practically impossible for anyone in Eastern North America, except the specialist, to determine for himself specimens of crane-flies taken within that area. The present work has removed this obstacle and, therefore, fills an important gap in entomological literature. It will be widely welcomed by all who ever have occasion to deal with the taxonomy of these flies.

Mr. Alexander's work on this somewhat neglected group is so well known that it is scarcely necessary to comment on the thoroughness with which both the text and the illustrations have been prepared. The work is based on the study of a large number of collections, both public and private, and its geographical scope is much greater than is indicated in the title, all the species from Eastern North America being included.

Besides the portions concerned with classification and distribution, there are useful sections dealing with the immature stages, the haunts and habits of both larvae and adults. The larval habits are very varied, some species being aquatic, some inhabiting mud, others fungi, wood and bark, while a few feed upon leaves like caterpillars. Methods are described for rearing these various types of larvæ.

The external anatomy of the adult flies is treated from the taxonomic point of view, structures affording good taxonomic characters, such as the antennae and wing venation, receiving a relatively large space. In connection with the description of abdominal structures it may be mentioned here, although not in criticism of Mr. Alexander's work, that the term "pleurite" as applied to the structures attached to the caudal margin of the ninth abdominal sternite, is morphologically incorrect, these parts being undoubtedly *coxites*, and having nothing to do with the pleural region of the segment.

The analytical keys appear to be excellent in every respect, so far as can be judged by one who is not a specialist in this group. The details of distribution for each species in New York State are not given in the decriptive part, but in the special section on distribution. An important feature of this section is the discussion of the distribution of the Tipulidae and related familes by life-zones. Following the definitions of the various zones, lists of characteristic plants and crane-flies are given. Between the Canadian and Transition Zones another zone, or sub-zone, the Canadian-Transition, is recognized, a distinction which undoubtedly has its advantages, although it is largely a matter of convenience as to how many zones should be recognized within the territory discussed, where in reality the changes depending on latitude, except where modified by local conditions, are entirely gradual. Some of the plants listed for the Transition Zone are, in the reviewer's opinion, typical of the Upper Austral, such as *Chamaecyparis thycides*, *Juglans nigra* and *Sassafras variifolium*.

"The number of species of Crane-flies that should occur in New York State is probably not less than three hundred and this figure seems similarly appli-

cable to many areas of equal extent and equal diversity of ecological conditions in the North Temperate Zone."

It is almost superfluous to add that this excellent work should be in every entomological library, and that no teacher of systematic entomology can afford to be without it. E. M. W.

ORTHOPTERA OF NORTHEASTERN NORTH AMERICA with Special Reference to the Faunas of Indiana and Florida. By W. S. Blatchley. The Nature Publishing Co. Indianapolis, 1920. 784 pp. 5 plates and 246 text figures.

The aim of this manual is to furnish a ready means of identifying any species of Orthoptera found in the United States east of the Missippi River and Canada east of the 90th meridian. It is intended for the use of the beginner rather than the specialist, but the subject matter is treated in such detail that it is thoroughly well adapted to the needs of the most advanced student as well.

It is an outgrowth of the author's well-known treatise on the Orthoptera of Indiana, but not only deals with a large number of species not included in the Indiana fauna, but the data on the latter forms is revised and considerably expanded. It also differs in plan from the older work in that it contains an alphabetical list of synonyms at the end of the book, instead of listing these under the head of each species; although the principal synonyms are mentioned in the notes that follow the descriptions.

One of the many excellent features of the book is the full discussion of the haunts, habits and songs of the various species, in which Mr. Blatchley has quoted at considerable length from other authors, selecting those passages which are considered to be of most value to the subject.

The illustrations are for the most part selected either from the author's earlier work or from the works of other specialists, but include also two plates of excellent original figures, by Mr. Fox, of the genitalia of the various species of the genus *Ceuthophilus*. Unfortunately a few of the text figures were inverted by the printer, but the pages on which these occur have already been reprinted with the figures in their correct positions. One of these figures is that of *Arphia sulphurea*, and it was unfortunate that this figure was selected to illustrate this species since, in the reviewer's opinion, it must have been taken from some other species, the tegmina being quite unlike those of an Arphia in their transverse fasciae, which with the shape and pattern of the hind wings, are typical of *Circotettix verruculatus*.

It is the reviewer's unpleasant duty to point out also certain other errors and inaccuracies in this otherwise excellent manual, which have come to his notice.

The Articulata (p. 12) are divided into two great groups, the Vermes and the Arthropods. The term Vermes is here used, of course, for the segmented worms (Annelida) only. It is now obsolete as the name of a taxonomic group, but when in use was understood to include a number of other groups besides the Annelida.

In the description of the mouth-parts on p. 14 it is stated that the labial palpi are attached to the labrum, and no mention is made of the labium.

On page 21 the term *tergite* is used to designate one side of a tergum, whereas it is generally employed to denote the entire dorsal sclerite.

On p. 22 the supra-anal plate (of the locust) is said to be the tergum of the tenth abdominal segment. It is really the eleventh, as is correctly indicated in the figure on the same page.

The family name used for the grouse locusts is Tetrigidæ, since the author objects to the confusion which is likely to arise from the use of both names Acrydiidæ and Acrididæ (the latter being the family to which the ordinary locusts belong). If, as stated on p. 187, the name Acrididæ were derived from the Latin *Acridium*, its proper spelling would be Acridiidæ, and it would indeed be objectionable to use both this term and Acrydiidæ, since *Acridium* is merely an amended spelling of Acrydium. But the name Acrididæ is not derived from Acridium but from Acrida (an Old World genus) and if *Acrydium* is employed for the typical genus of grouse locusts, instead of *Tetrix*, the family name Acrydiidæ and the subfamily name Acrydiinæ must likewise be used, to conform with the established rules of nomenclature.

In the section on p. 745, entitled "Area and Life Zones Covered," the Hudsonian Life Zone as defined as equivalent to the entire Boreal Region of Merriam, and the Boreal Fauna is stated to be the fauna of this zone. According to Merriam the Hudsonian is the middle zone of the three into which the Boreal Region is divided, the others being the Arctic and Canadian; and although, as far as Orthoptera are concerned, there would be little need of these divisions, they are, on the whole, quite as distinct as the zones of the Austral Region.

Mr. Blatchley's definitions of the areas included in the other zones also differ from those generally accepted, but as the limits of the zones are not easily definable, such matters depend to a large extent upon personal preference and judgment. It is unfortunate, however, to select as typical of the Alleghanian fauna *Chorthippus curtipennis*, and *Melanoplus fasciatus*, since these species are distributed throughout the Canadian Zone well into the Hudsonian, if not to the Arctic. Two of the three representatives of the Carolinian Fauna, *Chloealtis conspersa* and *Melanoplus femur-rubrum*, are also in no respect characteristic of this fauna, both ranging through the Transition well into the Canadian Zone.

On the whole Mr. Blatchley has shown very good judgment, in our opinion, in his decisions as to the status of various forms described as species. *Tettix crassus* Morse is, e. g., very properly assigned to the synonymy of *Acrydium ornatum* Say, and *A. hancocki* (Morse) is placed as a variety of this species; while *Oe canthus quadripunctatus* Beutenm. is correctly placed as a variety of *O. nigricornis* F. Walk. He has not, however, accepted the present writer's decision in reducing *Podisma variegata* Scudd. to a race of *P. glacialis* Scudd., although this has been amply proven. In fact *variegata* grades by infinitesimal steps into *canadensis*, and if there is a line to be drawn anywhere it is between *canadensis* and *glacialis*.

It must not be thought that the points criticised affect seriously the usefulness of Mr. Blatchley's book, which we feel sure will prove a most valuable work of reference for all students of this interesting order for many years to come.

E. M. W.

In accordance with the regulations of the Post Office Department respecting the postage rates on monthly magazines, it has been necessary to issue the August and September number separately.

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NEW SPIDERS FROM UTAH.

BY RALPH V. CHAMBERLIN,
Cambridge, Mass.

DRASSIDÆ.

Zelotes fratris, sp. nov.

Male.—A species suggesting *Z. ater* in general appearance and structure. Cephalothorax, abdomen and legs black, the tarsi of the latter paler. Posterior row of eyes straight, the eyes nearly equal and equidistant, thus clearly contrasting with *ater*, in which the median eyes are larger and much more approximate to each other than to the laterals. Anterior row of eyes procurved as usual; the medians much smaller than the laterals, being about half the diameter of the latter, more than their diameter from each other, but very close to the laterals. Area of median eyes as wide in front as, or scarcely wider than, behind. Anterior tibiæ wholly unspined, not armed at distal end as in *ater*. Anterior metatarsi with a pair of spines at base. Palpus with apophysis suggesting that of *ater*, the bulb, however, differing decidedly in details and much more similar to that of *tuobus*. See fig. 18, 1 and 2.

Length 6.3 mm. Length of cephalothorax 2.8 mm. Length of tib.+pat. I, 2.6 mm.; of tib.+pat. IV 2.8 mm.

Locality.—Utah: Logan Canyon. Collected by my brother, Seth C. Chamberlin.

Aside from difference in the palpal organs which are represented in the figures, this form differs fom the male paratype of *tuobus* in having the tib.+pat. IV of the same length as the cephalothorax instead of much longer. In the male paratype of *tuobus* the cephalothorax is 3 mm. long, while the tib.+pat. IV measured 3.7 mm.

Zelotes lampra, sp. nov.

Female.—Cephalothorax shining black. Legs black, with all tarsi and the metatarsi of the first three pairs in the type paler. Abdomen black both above and below. Anterior row of eyes procurved in such degree that the tangent to the lower edge of the medians passes through or very near the centres of the laterals. Median eyes much smaller than the laterals, about their diameter apart, much closer to the laterals. Posterior row of eyes straight; median eyes larger than the laterals, scarcely their radius apart, an equal distance from the laterals. Quadrangle of median eyes wider behind than in front, a little longer than wide. Tibia I+II armed beneath near middle (or possibly a pair of spines). Metatarsi I and II each with a pair of subbasal spines beneath. Distinguished readily by the form of the epigynum, which is represented in fig. 19, 3.

Length 5 mm. Length of cephalothorax 2 mm. Length of tib.+pat. I 2 mm.; of tib.+pat. IV 2.36 mm.

Locality.—Utah: Salt Lake Co., Mill Creek.

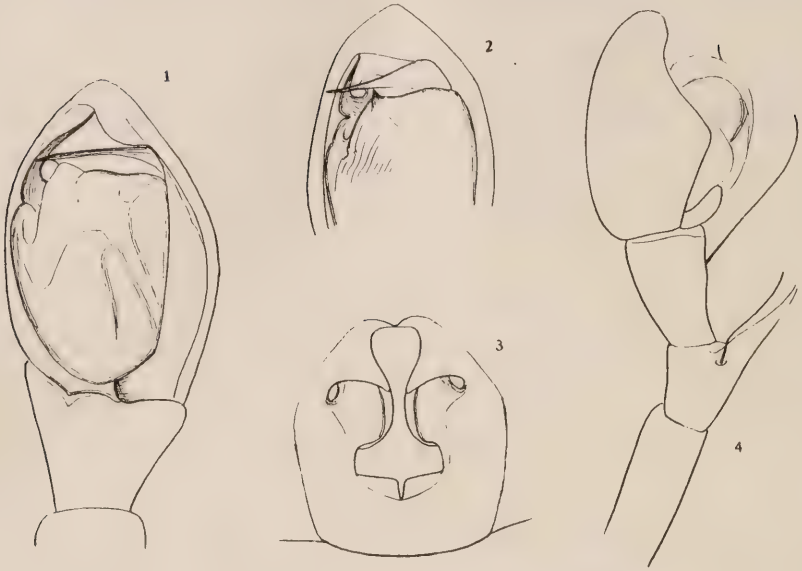

Fig. 19. 1. *Zelotes fratris*, sp. n.; ventral view of male palpus. x44. 2. *Zelotes tuobus* Chamberlin, distal part of tarsus of male palpus, ventral view. x44. 3. *Zelotes lampra*, sp. n., epigynum. x73. 4. *Linyphia hespera*, sp. n., male palpus, dorsal view. x44.

LINYPHIIDÆ.

Linyphia hespera, sp. nov.

Coloration essentially identical with that of *L. phrygiana*, with which it has heretofore been confused. Cephalothorax light yellow, narrowly margined with black and with a black median longitudinal line along dorsum which widens clavately up the head to the eyes, this clavate portion geminate by a median pale line and each half again divided at anterior end by a broad process of yellow. Abdomen marked by the typical dark herringbone longitudinal dorsal stripe, this often in part obliterated anteriorly. Legs yellow, typically annulate as in *phrygiana*, with femora commonly minutely maculate. The markings of body often reddish instead of black. The species is most readily distinguished by the characters of the male palpus. The patellar apophysis is similar in position and general form to that of *phrygiana* but differs uniformly in narrowing continuously distad to the tip, where it is acute instead of being clavate and rounded at the end as it is in *phrygiana*. The conspicuous principal seta of the tibia as viewed from above is inserted towards the distal end instead of near the middle; and at the base of the patella apophysis above is a seta, typically as long as to longer than the apophysis, which is geniculate above its base. See Fig. 19, 4. The epigynum is very similar to that of *phrygiana*. The median lobe seems to have the distal portion a little broader and the narrow isthmus a little shorter.

Length of male type 5 mm. Length of cephalothorax 2.37 mm.; width 2.1. mm. Length of tib.+pat. I 4.1 mm.; of tib.+pat. IV 2.7 mm.

Locality.—Utah: Bear Lake, Logan Canyon. Numerous specimens Females from Chalk Creek, Uintah Mts., seem also to be of this species.

Lepthyphantes lamprus, sp. nov.

Female.—Carapace fulvous, the eyes edged with black and a marginal stripe on each side also black. Sternum dusky, almost black. Legs fulvous, strongly annulate with black, the femur with an annulus at each end and one at middle, the patella with one at distal end, the tibia and tarsus each with one just proximad of middle and one at distal end, and the tarsus darkened at middle. Abdomen in general black, a network of yellowish or whitish lines above separating off a longitudinal row of black spots on each side with a pointed longitudinal mark between them at base. Venter with a light spot in front of spinerets. Head protruding a little forward above clypeus, the upper part of which is depressed, from where the latter slants forward. Anterior row of eyes straight; the median eyes decidedly smaller than the laterals and much nearer together, being rather less than their radius apart but nearly their diameter from the laterals. Posterior row of eyes straight; median eyes larger than the laterals from which separated by scarcely their radius, nearer to each other. Area of median eyes much wider behind than in front. Epigynum as shown in Fig. 20, 1.

Length about 3 mm. Length of cephalothorax 1.3 mm. Length of tib.+pat. IV 1.63 mm., the length of tib.+pat. I the same or very nearly so.

Locality.—Utah: Logan Canyon.

Fig. 20. 1. *Lethyphantes lamprus*, sp. n., epigynum, ventral view. x74. 2. The same, side view. x74. 3. *Bathyphantes phylax*, sp. n., left male palpus, ectal view. x44. 4. *Microneta, uta* sp. n., right male palpus, ectal view. x175.

Bathyphantes phylax, sp. nov.

Male.—Cephalothorax dusky over a yellowish ground. Legs yellowish, slightly darkened, less so distad of the patellæ. Cephalorax longer than wide in about the ratio 9:7. Head highest caudad of eyes, convex; sides rather steep and clypeus subvertical with head a little bulging forward above it. Lateral

eyes on rather pronounced tubercles suggesting those of some species of *Microneta*. Posterior row of eyes straight; median eyes a little less than their diameter apart, and a little more than their diameter from the laterals. Anterior row of eyes straight or scarcely recurved; median eyes less than their radius apart, their diameter from the laterals. Palpal organ with a broad membranous blade curving forward from base beneath the style, its edge denticulate above across its distal end. Hook bent into a semicircle with a subquadrate plate from its ectal side below and a spur at the caudodorsal angle of the latter as shown in Fig. 20, 3.

Length of cephalothorax 1.46 mm.; width 1.14 mm. Length of tib.+pat. I 1.74 mm.; of tib.+pat. IV 1.85 mm. Metatarsus I of nearly same length as tibia I.

Locality.—Utah: Bear Lake. One male.

Microneta uta, sp. nov.

Male.—Cephalothorax, abdomen and palpi black or nearly so. Legs fulvous, in part slightly dusky. Cephalothorax conspicuously narrowed in front of middle, obviously longer than broad (cir. 7: 5). Posterior row of eyes straight; the median eyes slightly larger, scarcely their diameter apart. Anterior eyes in a straight line; the eyes nearly equidistant with the medians smaller than the laterals. Head slanting obliquely forward from posterior row of eyes to anterior row, the anterior median eyes carried forward above upper part of clypeus, the clypeus slanting forward, its profile straight. Tibia of palpus widening distad and a little elevated above but without any distinct process. Tarsal hook abruptly bent back, the distal or recurving portion long. See Fig. 20, 4.

Length 1.75 mm. Length of cephalothorax .7 mm.; width .5 mm. Length of tib.+pat. I .76 mm.; of tib.+pat. IV, .86 mm.; of met. IV. 6. mm.

Locality.—Utah: Logan Canyon.

Diplocephalus cryptodon, sp. nov.

Female.—Cephalothorax and legs yellow of a dilute orange tinge. Abdomen dark gray. Posterior row of eyes conspicuously procurved; median eyes less than their diameter and more than their radius part, the same distance from the laterals or nearly so. Anterior row of eyes straight or nearly so; medians considerably smaller than the laterals, about their radius apart and scarcely farther from the laterals. Clypeus in height equalling the length of the median ocular area or a little lower. Median ocular area longer than wide. Upper margin of furrow of chelicera armed with four teeth of which the three nearest the claw are long and subequal, the fourth tooth smaller; lower margin of furrow with four similarly well separated but similarly much smaller teeth. Epigynum as shown in Fig. 21, 3.

Male.—The postocular swelling is slight, scarcely or not at all rising above level of eyes, the hair short and sparse, forming a median longitudinal line; lateral pits conspicuous. Posterior row of eyes procurved; medians half their longer diameter apart, nearly twice as far from the laterals. Anterior row of eyes straight; the medians much smaller than the laterals, less than their radius

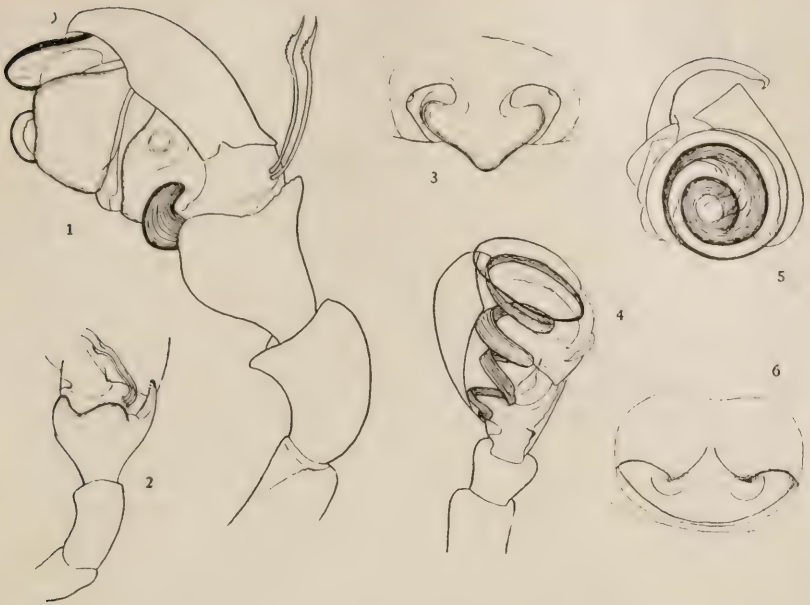

Fig. 21. 1. *Diplocephalus cryptodon*, sp. n., right male palpus, ectal view. x73. 2. Dorsal view of tibia and proximal portion of tarsus of same palpus. x44. 3. Epigynum. x73. 4. *Spirembolus vallicolens*, sp. n., male palpus, ventral view. x86. 5. Male palpus, distal view. x86. 6. Epigynum. x103.

apart, their diameter from the laterals. In the palpus the tibia at its distal end is expanded into a thin cup or calyx over the base of the tarsus as in *dentipalpis* (Emerton). On the inner surface of the dorsal part of this calyx, or hood, is borne a small tooth but this is well removed from the edge and is smaller and less chitinous than that of *dentipalpis*. In contrast with the conspicuously long and exposed embolus of *dentipalpis*, that of the present species is comparatively short though presenting a similar double curve, as shown in Fig. 21, 1 and 2.

Length of male 2.5 mm. Length of cephalothorax 1.2 mm.; width 1 mm.

Locality.—Utah.

Spirembolus, gen. nov.

Cephalothorax normally narrowed anteriorly, the front obtuse. Clypeus higher than the length of median eye area, strongly convex in dorsal views. Anterior row of eyes from straight to procurved; medians much smaller than the laterals and nearer to each other than to the latter. Posterior row of eyes from straight or slightly recurved, as in the genotype, to slightly procurved; medians farther from each other than from the laterals, or the eyes nearly equidistant (male of *vallicolens*). Area of median eyes wider than long. Anterior tarsi shorter than the metatarsi. In the male palpus the tibia bears a slender apophysis which extends over the tarsus which ends in a slender pointed tip which is bent abruptly. Cymbium of tarsus conspicuously elevated in middle above; bulb characterized by having the embolus coiled in a spiral which widens from the base of the bulb distad, the coils being nearly at right angles to the long axis of the joint, and thus quite from the disposition in *Spiropalpus*.

Genotype.—Cornicularia monticolens Chamberlin.

Includes also the species described below. These forms are at once distinguishable from others by the peculiar male palpi which are notably fixed in structure in comparison with other characters such as those of the cephalothorax.

Spirembolus vallicolens, sp. nov.

Male.—Carapace dusky over yellow, darker toward lateral margins. Legs and palpi somewhat paler than carapace. Labium and endites in colour like the carapace, the sternum darker. Abdomen blackish, without definite markings. Anterior portion of pars cephalica elevated but not bulging forward over base of clypeus as it does in *monticolens*, the lower part of clypeus slanting farther forward, the head in dorsal view not so convex anteriorly. The posterior row of eyes is slightly procurved instead of a little recurved as it is in *monticolens*, and the eyes are equidistant, though in the female the medians are obviously more widely separated. Anterior row of eyes conspicuously procurved instead of straight; median eyes much smaller than the laterals, nearer to each other than to the laterals, but much less widely separated from the latter than in *monticolens* in which the convexity carries the medians far forward. Palpus very similar to that of *monticolens;* the tibial apophysis is more strongly and uniformly curved than in the genotype, in the latter being comparatively straight above the curving basal portion. See Fig. 21, 4 and 5.

Female.—The form of the epigynum is shown in Fig. 21, 6.

Length of male 1.85 mm. Length of cephalothorax .7 mm.; width .58 mm.

Locality.—Utah: Mill Creek. A number of specimens secured by sifting leaves in September.

It will be noted that the less elevated and forwardly protruding head in this form is associated with considerable differences in eye relations from those in the genotype.

Catabrithorax gen. nov.

Much resembles Gongylidiellum in its broad cephalothorax with frons much wider than the area occupied by the eyes. Clypeus lower than length of median eye area, in the genotype much so. Anterior row of eyes straight or but very slightly curved, eyes close together, typically less than their radius apart, if any different the median eyes closer than to the laterals, median eyes smaller than the laterals; posterior row of eyes straight, the eyes nearly equidistant, the medians being a little nearer each other than to the laterals. Area of median eyes as wide as or a little wider than long. Anterior tarsi shorter than the metatarsi. In the male palpus the tibia has above at anterior end on mesal side a stout simple hook which curves ectad. The tarsal hook arising at distal end of bulb, where it is stout, runs to base of bulb and then bends back distad, this second part substraight, narrowing distad, unbranched, and free from the bulb. Embolus issuing at distal end of bulb from a tube-like fold. (Cf. Figs.)

Genotype.—*C. clypiellus*, sp. nov.

The structure of the male palpal organ is obviously different from that of *latebricola* Cambridge, type of Gongylidiellum, and the tarsi of the legs are shorter than the metatarsi. The close correspondence of the important features of the palpal organ in the two species here described, while differences in such

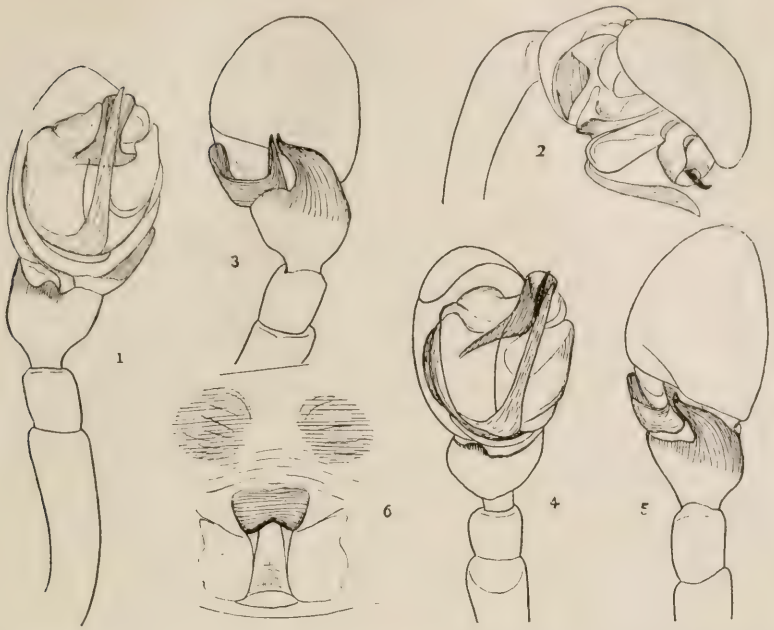

Fig. 22. 1. *Catabrithorax clypiellus*, sp. n., ventral view of left male palpus. x100. 2. Distoectal view of right male palpus. x100. 3. Dorsal view of left male palpus. x100. 6. *Anyphaena intermontana*, sp. n., epigynum. x44.

characters as height of clypeus, etc., are so marked, indicates the importance of the palpal organ in generic distinctions in this group.

Catabrithorax clypiellus, sp. nov.

Male.—Carapace light dusky yellow. Legs yellow. Abdomen light gray. Remarkable for the extremely low clypeus, the height of which is less than the diameter of the lateral eye and does not exceed that of the smaller medians. Anterior row of eyes straight or rather slightly recurved, eyes close together, separated by less than the radius of the median eyes; median eyes smaller than the laterals. Posterior row of eyes straight; eyes equal and equidistant, less than a diameter apart. Area of median eyes as wide as, or very slightly wider than, long, clearly wider behind than in front (ratio about 4:3). Upper margin of furrow of chelicera armed with four teeth, the lower margin with a series of five or six smaller teeth. Sternum broad, shield-shaped, produced between posterior coxæ, posteriorly truncate, strongly convex. Labium very short and broad, distally truncate, not narrowed. Cephalothorax unusually broad and low, the lateral margins widely convex, the anterior end broad, the eye region a little protruding over the clypeus. In the male palpus the tibia presents above a chitinous apophysis which distally curves first outward and then distad. Paracymbium and embolus as shown in Fig. 22, 1, 2 and 3.

Length 1.63 mm. Length of cephalothorax .66 mm.; width .58 mm. Length of tib.+pat. IV nearly equalling width of cephalothorax, the length of tib.+pat. I less than the width of cephalothorax.

Locality.—Utah: Logan Canyon. One male.

Catabrithorax ceuthus, sp. nov.

Male.—Cephalothorax and sternum dusky, almost black, the eye region solid black, the black protruding in a rounded spot on upper median part of clypeus. Legs fulvous, slightly smoky. Abdomen dark grey. Cephalothorax of moderate width; head elevated, sides slanting, eye region protruding above clypeus. Sternum rather narrow in comparison with that of *clypiellus*, conspicuously convex, strongly narrowing from the anterior and caudad, sides but moderately convex, narrowly produced between posterior coxæ. Labium anteriorly weakly convex, narrowing distad. Anterior row of eyes very slightly procurved; median eyes smaller than the laterals, very close together, being less than their radius apart, farther from the laterals. Area of median eyes much narrower in front than behind, fully as wide as long. Posterior row of eyes weakly procurved; eyes equal; median eyes about their radius apart, an equal or scarcely greater distance from the laterals. Clypeus equalling or slightly lower than the length of area of median eyes (ratio about 7:8). Tibia of male palpus with an uncate apophysis above, the hook turning outwards and then distad at tip as in *clypiellus*. Structure of palpal organ very similar to that of *clypiellus*, as shown in Fig. 22, 1, 2 and 3.

Length of cephalothorax .75 mm.; width .58 mm. Length of tib.+pat. I equal to width of cephalothorax or very slightly longer (.6 mm.). Length of tib.+pat. IV .65 mm.

Locality.—Utah: Bear Lake. One male.

Separable at once from the preceding species by its much higher clypeus, etc. It is a darker species.

CLUBIONIDÆ.

Anyphaena intermontana, sp. nov.

Female.—Cephalothorax and legs pale, of a weakly greenish tinge, the legs not at all annulate. Abdomen also pale, the dorsum or side with numerous longitudinal spots or streaks of dark, and the middorsal region behind with indistinct and more or less broken dark chevrons. Anterior row of eyes straight or slightly recurved; median eyes smaller than the laterals, about their radius apart, less than half as far from the laterals. Height of clypeus but little more than equalling the radius of an anterior median eye. Posterior row of eyes a little procurved; eyes subequal; median eyes a little more than their diameter apart, about their diameter from the laterals. Tibia I armed beneath with a subbasal and a submedian pair of spines, the first overlapping the bases of the second; a single spine on anterior face. Tibia II with a single subbasal spine and a pair of submedian spines, none at distal end.

Epigynum as shown in Fig. 22, 6.

Length 5.8 mm. Length of cephalothorax 2.6 mm. Length of tib.+pat. I 2.75 mm.

Locality.—Utah: Mill Creek.

In the form of epigynum suggesting *A. pacifica* (Banks), known from the State of Washington, though this is proportionately shorter and is broader anteriorly, with the median channel less elongate, etc. It is readily separable

by the characters of the eyes, the anterior row in *pacifica* being distinctly procurved instead of straight or slightly recurved, with the eyes obviously more widely separated and the medians clearly smaller relatively to the laterals, the clypeus higher, etc. In *pacifica* tibia I bears in front two spines instead of one, the ventral spines do not typically overlap, and tibia II is armed with a spine at the distal end.

A NOTE ON THE WINGLESS TIPULID *CHIONEA VALGA* HARRIS.

BY R. C. TREHERNE,
Entomological Branch, Dominion Department of Agriculture.

During March, 1920, Mr. H. J. Blurton, trapper, of Mara, B. C., brought into my office some specimens of insects taken from above snow line at the north end of the Okanagan Valley. One of these insects has turned out to be the wingless tipulid *Chionea valga* Harris, and it constitutes a new record from the West. The determination was made by Dr. Nathan Banks through Dr. J. McDunnough, of Ottawa, and my attention was drawn to the article on this genus that appears in Psyche, Vol. XXIV, p. 142, October, 1917, by Dr. Werner Marchand of the Department of Animal Pathology, the Rockefeller Institute for Medical Research, Princeton, New Jersey. Owing to the interest of this capture I requested Mr. Blurton to give me the leading notes of his observations for record and publication. These notes follow, arranged in manuscript form.

"I have noticed them for many years in the Hunter's Range of Mountains, east of Mara, B. C., and they have always attracted my attention by their peculiarities in regard to the altitude they live at in the mountains, their mode of travel, and the weather conditions they seem to prefer. These insects seem to live principally between 5,000 and 6,500 feet above sea level, and in a country where spruce and balsam trees grow, living principally in the large, open spaces near timber line, but very seldom where timber is plentiful. When travelling over the snow they always appear to be in a great hurry, and they move in nearly straight lines from one point to another, not travelling in an erratic manner at all, but as if they had some special destination in mind. I noticed when I approached one that it would crouch down when I am near, as if it could feel the vibrations in the snow made by the weight of my snowshoes falling on the snow, and would remain motionless until I had passed. This habit is not invariable, but it happens often enough to be noticeable, showing that this species is either sensitive to vibrations in the snow or to the sounds made by my movements.

It is very noticeable that this insect only selects cold, snowy weather to travel in, and it is very active on the surface of the snow during the months of January, February, March and April, even when the temperature is below zero. If the atmospheric temperature is warm enough to make the snow surface moist they apparently do not travel. I have noticed in April that if the sun in the morning shone brightly, causing a slight thaw, there would be a few *Chionea* visible, but if the weather changed in the afternoon and became colder with a flurry of snow that large numbers of *Chionea* both males and females, came hurrying from all directions. The adults seem very sensitive to warmth and will die in a few minutes if carried in a warm hand, although if placed on the

snow before they are quite dead, they will soon commence to struggle, stretch their legs and eventually recover entirely. I also noticed that if carried in a closed match box in one of my pockets they only lived a very few hours; possibly a large male, under these circumstances, might live 3 to 4 hours. If they were walking over the snow and my warm hand was placed near them they would hurry away from it. On the other hand, they would walk quite freely over my snowshoes, which of course were cold, thus proving to me that it is warmth that they retreat from.

There is another peculiar feature in their habits that I have noticed. They have an extremely strong grip, and it is very difficult indeed to shake them loose from anything to which they are attached. For instance, it is hardly possible to shake them loose from the match-box in which I have frequently stored them when collecting, and it is equally difficult to remove them from sticks or thongs of snowshoes.

Apparently their object in travelling so rapidly over the snow is to enable the sexes to come together. When they were active on stormy days in April, I have captured numbers of both sexes, placing them in my collecting box, and it was only a few moments before copulation took place. The sexual grip is also very strong, it being retained even when placed in alcohol.

My attention has been drawn to the article in Psyche by Werner Marchand, who mentions that *Chionea* is affected by the warmth of the hand and that it travels in straight lines. I could have made fuller observations on this insect if I had known it was of interest. For instance, I could have found out whether copulation takes place in other months than April. It was my belief that *Chionea* was predaceous on the snow fleas but I have changed my opinion, the snow fleas being very active in warm, thawing weather, whereas *Chionea* is not abroad in such weather except to a very limited extent."

CORRECTIONS TO MR. GUNTHORP'S SUMMARY OF WOOD'S MYRIOPODA PAPERS.

It seems desirable for the benefit of those not familiar with the literature of the subject to call attention to certain inaccuracies in Mr. Gunthorp's recent "Summary of Wood's Myriapoda Papers."*

1. Mr. Gunthorp states that Wood's first paper "described four species as new." As a matter of fact twenty new species are there described.

2. Likewise incorrect is the statement that in the second paper, "On the Chilopoda," "twenty-nine new species are included." There are really forty-five described as new.

3. It is written that Wood's paper on "New Polyzoniidæ" is "the one paper he wrote on foreign material." On the contrary, Wood's first paper, mentioned above, is based chiefly on foreign material, sixteen of the twenty new forms described being exotic; and in the second paper, on the Chilopoda, seventeen exotic species are described as new.

4. The number of species described by Dr. Wood "from elsewhere" than the United States is said to be two. The number is actually thirty-five.

*Canadian Entomologist, May, 1920, p. 112.

5. It may be added that in summarizing the genera and species to be credited to Wood, Mr. Gunthorp does not take into consideration those now suppressed as synonyms. Similarly it should have been indicated that the list of species from the United States simply records them as given by Wood, no indication being given of their present generic position or of those relegated to synonymy. Thus, the generic names Cermatia, Opisthemega, and Strigamia are no longer in use, having been antedated by other names; and the species listed under Strigamia, Julus, Polydesmus, etc., are now known to represent a variety of different genera and families.

6. It is stated that Dr. Wood wrote several papers in the Insecta. This seems to be erroneous, as there is no record of his ever having published anything on insects proper. R. V. CHAMBERLIN.

WOOD-BORING BEETLES OF BLACK LOCUST.

BY O. W. ROSEWALL,
Louisiana State University, Baton Rouge, La.

From time to time it has been noticed that wood-boring insects were plentiful in the dead or partly dead, young Black Locust trees (*Robinia pseudacacia*) in the University Arboretum. During the past year some of the infested wood was placed in glass containers in the University Insectary, and the following beetles were reared:

Order Coleoptera—
- Family Bostrichidæ—
  - *Sinoxylon basilare*, Say.
- Family Buprestidæ—
  - *Agrilus egenus* Gory.
- Family Cerambycidæ—
  - *Ecyrus dasycerus* Say.
  - *Liopus alpha* Say.
  - *Liopus fascicularis* Harr.
  - *Liopus variegatus* Hald.
  - *Neoclytus erythrocephalus* Fab.
  - *Phyton pallidum* Say.

The above-named beetles emerged from about 15 feet of the wood, of which none was over ¾ of an inch in diameter and most of it less than ½ inch in diameter. Practically all the limbs had been removed from these small trees, so the larvæ had attacked the main part of the trees.

The beetles emerged in numbers and dates as follows:

Of *S. basilare* Say., 4 emerged respectively on the following dates, March 23, April 6, May 1 and July 25; of *A. egenus* Gory., 3 emerged respectively on April 5, May 1 and July 1; of *E. dasycerus* Say., 10 emerged between the dates April 21 and June 15; of *L. alpha* Say., 1 emerged on May 1; of *L. fascicularis* Harr., 31 emerged between the dates April 12 and May 2; of *L. variegatus* Hald., 1 emerged on April 2; of *N. erythrocephalus* Fab., 2 emerged respectively on April 1 and May 13; of *P. pallidum* Say., 13 emerged between the dates of April 16 and May 21.

A BIBLIOGRAPHY OF THE LITERATURE ON THE DESCRIBED TRANSFORMATIONS AND FOOD PLANTS OF NORTH AMERICAN SPECIES OF AGRILUS (COL.).

BY C. A. FROST AND H. B. WEISS.*
New Brunswick, N. J.

In 1900 Chittenden published a paper on the "Food Plants and Injury of North American Species of Agrilus,"[1] in which 31 species were listed together with notes on food plants and injury. Since this paper, nothing of a similar nature has appeared, and during the period between 1900 and 1920 new species have been described and much additional biologic information on several economic species has accumulated The present paper, therefore, brings together to date all of the references to the literature on the life-histories, habits and food plants of those of our North American species about which such information is known, supplemented by very brief notes on the important economic ones.

The habits of such species as *vittaticollis* Rand., *bilineatus* Web., *anxius* Gory, *ruficollis* Fab., and *sinuatus* Oliv., appear to be fairly well known, due undoubtedly to their activities as enemies of cultivated and forest trees and plants which necessitated studies. The habits of many other members of this extensive genus are less completely known and of a large number nothing whatever concerning food plants, etc., appears to have been recorded. In the list which follows, references to the places of original description and geographical distribution have been omitted as such information can be found in Leng's "List of the Coleoptera of North America."

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This is the common red-necked cane-borer of blackberry, dewberry and raspberry. The egg is inserted in the bark near the base of a leaf in the new growth and the larva burrows upward in the sapwood going around the stem in a spiral course, thus girdling the cane and causing an irregular swelling or gall, varying from 1 to 3 inches in length, and bearing longitudinal slits or splittings.

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On poplar sprouts (Blanchard). Beating *Alnus incana* (Frost).

A. otiosus Say.

Blatchley, Col. Ind., p. 798, 1910.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.

Hamilton, Trans. Am. Ent. Soc., Vol. XXII, p. 364, 1895.
Knull, Ent. News, Vol. XXXI, p. 8, 1920.
Packard, 5th Rept. U. S. Ent. Comm., p. 367, 1890.
Smith, Ins. N. J., p. 295, 1909.

Occurs on foliage of oak and hickory (Blatchley). Breeds in hickory, oak, locust, etc., (Smith). Attacks maple, dogwood, redbud, hickory, black walnut (this may refer to *juglandis* Knull), and probably infests butternut, box-elder, oak and perhaps locust (Chittenden). Hickory is host: reared from dead branches of persimmon (*Diospyros virginiana*) (Knull). On *Corylus americana* leaves and oak leaves (Frost).

A. juglandis Knull.

Knull, Ent. News, Vol. XXXI, p. 8, 1920.
Breeds in outer bark of living butternut (*Juglans cinerea*) (Knull).

A. frosti Knull.

From leaves of oak and hickory (Frost).

A. defectus Lec.

Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Reared from dead branches of white oak (*Quercus alba*) (Knull). On oak leaves (Frost).

A. crinicornis Horn.

Frost, Can. Ent., Vol. XLVII, p. 144, 1915.
On leaves of red raspberry (Frost).

A. masculinus Horn.

Blatchley, Col. Ind., p. 799, 1910.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Stromberg, Can. Ent., Vol. XXVI, p. 36.
On box-elder (Stromberg). On foliage of buckeye (Blatchley). Reared from sapwood of dead box-elder (*Acer negundo*) (Knull). On red oak leaves (Frost).

A. arcuatus Say.

Blatchley, Col. Ind., p. 799, 1910.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Ruggles, 17th Rept. St. Ent. Minn., p. 15, 1918.
Stromberg, Can. Ent., Vol. XXVI, p. 36.
This species is the oak twig girdler. The egg is deposited on the side of the twig near the terminal bud, and the resulting larva encircles the twig beneath the bark, causing the death of the part beyond the burrows. The adults feed on the foliage, eating out irregular patches near the edges of the leaves.
Reared from girdled branches of beech (*Fagus americana*) and hickory (*Hicoria ovata*) (Knull).

A. arcuatus var. **coryli** Horn.

Blanchard, Ent. Amer. Vol. V, p. 32, 1889.
Blatchley, Col. Ind., p. 799, 1910.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.
Frost, Can. Ent., Vol. XLVIII., p. 386, 1916.
Hamilton, Trans. Am. Ent. Soc., p. 364, 1895.

On hazel (*Corylus americana*) (Blanchard). On hazelnut (Blatchley).
On *Corylus americana* and *C. rostrata* (Frost).

A. arcuatus var. **torquatus,** Lec.

Ruggles, 17th Rept. St. Ent. Minn., p. 15, 1918.
The habits of this variety are similar to those of *A. arcuatus.*

A. cupricollis Gory.

Blatchley, Can. Ent., Vol. LI, p. 29, 1919.
Occurs on huckleberry and other low shrubs (Blatchley).

A. angelicus Horn.

Rohwer, Proc. Ent. Soc. Wash., Vol. XXI, pp. 4–8, 1919.
Infests *Quercus agrifolia.*

A. champlaini Frost.

Britton, Rept. Conn. Agric. Exp. Sta., pp. 291–296, 1912.
Frost, Can. Ent., Vol. XLIV., p. 245, 1912.
The larva of this species causes conspicuous swellings or galls on the branches of the hop hornbeam or ironwood (*Ostrya virginica*).

A. townsendi Fall.

Fall, Tr. Am. Ent. Soc., Vol. XXXIII, p. 234, 1907.
Beaten from *Quercus gambellii* (Townsend).

A. macer Lec.

Chittenden, Bull. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.
Injurious to *Celtis occidentalis* in Texas (Schwarz).

A. vittaticollis Rand.

Austin, Proc. Bost. Soc. Nat. His., Vol. XVII, p. 276, 1875.
Blanchard, Ent. Amer., Vol. V, p. 32, 1889.
Blatchley, Col. Ind., p. 800, 1910.
Brooks, Jour. Agric. Res., Vol. III, 2, pp. 179–185, 1914.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.
Hamilton, Tr. Amer. Ent. Soc., Vol. XXII, p. 364, 1895.
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Smith, Ins. N. J., p. 295, 1909.
This species, known as the apple root borer, has recently been investigated by Brooks. Eggs are glued to the trunk close to the ground and the larva bores directly through the bark to the cambium, and then through the cambium down the trunk to the ground and outward through a convenient root, finally entering the solid wood of the root where much feeding is done.
Seems to live on shadberry (*Amelanchier canadensis*) (Austin). Feeding on leaves of thorn, shadbush and chokecherry (Blanchard). On leaves of *Oxydendrum* (Fiske). Larva attacks apple, pear, wild thorn, wild crab and service (Brooks). From leaves of *Pyrus* and *Amelanchier* (Frost).

A. dozieri Fisher.

Fisher, Proc. Ent. Soc. Wash., p. 67, 1918.
On foliage of blue birch (*Ostrya* sp.) (Fisher).

A. bilineatus Web.

Anderson & Rankin, N. Y. Cornell Bul. 347, 586, 1914.
Britton, Conn. Rept. 13, p. 250, 1914.
Burgess, U. S. Farmers Bull. 564, p. 5, 1914.
Burke, U. S. D. A. Year Book, p. 401, 1909.

(To be continued.)

Chapman, Jour. Agric. Res., Vol. III, 4, pp. 283–293, 1915.
Chittenden, U. S. D. A., Div. Ent. Circ. 24, 2nd ser. pp. 1–8, 1897.
" U. S. D. A., Div. Ent. Bul. 7, n. s., pp. 67–75, 1897.
" U. S. D. A., Div. Ent. Bul. 22, n. s., pp. 51–64, 1900.
" U. S. D. A., Year Book, pp. 726–733, 1902.
Felt, N. Y. St. Mus. Mem. 8, p. 280, 1905.
" N. Y. Rept. 27, p. 113, 1912.
" Jour. Econ. Ent., Vol. VII, p. 373, 1914.
" N. Y. Rept. 29, 1915.
Hamilton, Trans. Am. Ent. Soc., Vol. XXII, p. 364, 1895.
Harrington, 27th Ann. Rept. Ent. Soc. Ont., p. 71, 1896.
Hopkins, Ins. Life, Vol. VII, pp. 145–151, 1894.
" Can. Ent., Oct., pp. 243–250, 1896.
" Proc. 19th Ann. Meet. Soc. Prom. Agric. Sci., pp. 103–108, 1898.
" U. S. D. A., Div. Ent. Bull. 48, 1904.
Howard, U. S. R. Ent., p. 11, 1914.
Johnson, Ann. Rept. Pa. Dept. Agric., pp. 345–64, 1896.
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Metcalf & Collins, U. S. Farmers' Bul. 467, p. 10, 1911.
Packard, 5th Rept. U. S. Ent. Comm., p. 222, 1890.
Ruggles, 15th Rept. St. Ent. Minn., p. 54, 1914.
" 14th Rept. St. Ent. Minn., p. 55, 1911–1912.
Smith, N. J. Rept., p. 348, 1910.
" Ins. N. J., p. 295, 1909.
Washburn, Minn. Rept. 14, p. 55, 1912.
" U. S. D. A., Year Book, p. 515, 1906.
" U. S. D. A., Year Book, pp. 574–578, 1908.

The two-lined chestnut borer is known as a serious pest of chestnuts and oaks. Eggs are deposited in small clusters in bark crevices and the winding larval burrows are made in the wood and cambium layer, and occur on the tree from small branches less than an inch in diameter down to the roots. The adults usually eat around the margins of the leaves, but also tear off the epidermis and at times consume nearly the entire leaf, including the midrib.

On trunk of dead white oak and red oak leaves (Frost).

A. auroguttatus Schaef.

Schaeffer, Brook. Inst. Mus. Sci. Bul. 1, 7, p. 149, 1905.

Beating branches of black oak (Schaeffer).

A. granulatus Say.

Blanchard, Ent. Amer., Vol. V, p. 32, 1889.
Burrill, 12th Rept. St. Ent. Ill., pp. 121–122, 1883.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.
Manee, Ent. News, Vol. XXIV, pp. 167–171, 1913.
Packard, 5th Rept. U. S. Ent. Comm., p. 443, 1890.

Burrill states that the larva of this species makes tortuous galleries in the living tissue of the Lombardy poplar, these galleries running for the most part in irregularly horizontal directions across the grain of the wood.

Swept from *Salix* leaves at Littleton, Col. (Frost).

A. pensus Horn.

Frost, Can. Ent., Vol. XLVII, p. 144, 1915.

On leaves of *Ostrya* and beaten from *Alnus incana* (Frost).

A. anxius Gory.

Burke, U. S. D. A., Year Book, p. 403, 1909.
Chamberlain, Sci. Amer. 20, Jan., p. 42, 1900.
Chittenden, U. S. D. A., Div. Ent. Bul. 18, n. s., pp. 44–51, 1898.
" U. S. D. A., Div. Ent. Bul. 22, n. s., pp. 64–68, 1900.
" U. S. Fores. Bul. 46, pp. 63–80, 1904.
Davis, Jour. Econ. Ent., Vol. III, p. 184, 1910.
" Ins. Life, Vol. IV, p. 66 (*torpidus*).
Felt, Count. Gentl. Dec. 15, p. 993, 1898.
" N. Y. St. Mus. Bul., Vol. 8, No. 37, 1900.
" N. Y. St. Mus. Mem. 8, p. 284, 1905.
" N. Y. Rept. 25, p. 98, 1910.
" N. Y. Rept. 27, p. 108, 1912.
" Gard. Mag. Feb., p. 36, 1912.
" N. Y. Rept. 28, p. 101, 1913.
" N. Y. St. Mus. Bul. 200, p. 49, 1917.
Fernald, Jour. Econ. Ent., Vol. V, p. 246, 1912.
" Mass. Rept. 24, I, p. 83, 1912.
" Mass. Rept. 25, II, p. 85, 1913.
Forbes, Bul. 151, Ill. Agric. Exp. Sta., p. 515, 1911.
" Ill. Ent. Rept. 26, p. 53, 1911.
Gibson, Ont. Ent. Soc. Rept. 40, p. 13, 1910.
Hopkins, U. S. D. A., Div. Ent. Bul. 48, 1904.
Houser, Bul. 332, Ohio Agric. Exp. Sta., p. 326, 1918.
Hutchings, 9th Ann. Rept. Quebec Soc. Prot. Pl. p. 65, 70, 1916.
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Lochhead, Rept. Ont. Agric. Coll. & Exp. Farms, 1902.
Ruggles, 14th Rept. St. Minn., p. 57, 1911, 1912.
Sanders, Wis. Bul. 227, p. 22, 1912.
Slingerland, Proc. West. N. Y. Hort. Soc., Apl., 1899.
" N. Y. Cornell Bul. 234, 1906.
Smith, Ins. N. J., p. 295, 1909.
" N. J. Rept., p. 415, 1909.
" N. J. Rept., p. 348, 1910.
Swaine, Ont. Ent. Soc. Rept. 43, p. 91, 1913.
" 7th Ann. Rept. Quebec Soc. Prot. Pl., pp. 91–115, 1915.
" Can. Fores. Jour., Vol. XIII, p. 1928, 1918.
Turner, Ga. Bd. Ent. Bul. 49, p. 28, 1918.
Washburn, Minn. Rept. 12, p. 98, 1908.
" Minn. Rept. 14, p. 57, 1912.
" U. S. D. A., Year Book, p. 550, 1907.
" U. S. D. A., Year Book, p. 578, 1908.

Known as the bronze birch borer, this species is a serious pest of the birches. Eggs are deposited in crevices in the bark and the first tunnels constructed by the larvæ lie close under the bark. As feeding continues, the burrows are

extended without particular definiteness and extend deep into the wood or near the bark, and become much convoluted affairs. The result is a fatal girdling. Dark reddish-brown spots often form on the bark above where the tissue is riddled. Various species of birch are attacked. Mr. W. F. Turner records this species as infesting pecan. Burke states that it attacks poplars, cottonwoods, aspens and balm-of-gileads. Galls on branches of willow (Davis). On poplar leaves and ovipositing in trunk of living poplar (Frost). Where the references refer to birch and poplar, they are undoubtedly correct, but there is a possibility of *anxius* having been confused with other species where other food plants are mentioned.

A. acutipennis Mann.

Blanchard, Ent. Amer., Vol. V, p. 32, 1889.
Blanchard, Tr. Am. Ent. Soc., Vol. XVIII, p. 308.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.

On foliage of oak shrubs (Blanchard). On foliage of *Corylus americana* and red oak (Frost).

A. auricomus Frost.

Frost, Can. Ent., Vol. XLIV, p. 250, 1912.

A. couesii Lec.

Chittenden, Bul 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.
Cockerell, Jour. N. Y. Ent. Soc., p. 150, 1897.
On *Mentzelia nuda* (Cockerell).

A. pulchellus Blanch.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.
Breeds in roots of *Erigeron* (Hubbard & Schwarz).

A. cephalicus Lec.

Knull, Ent. News, Vol. XXXI, p. 10, 1920.

Reared from sapwood of dead dogwood (*Cornus florida*) (Knull). On leaves of *Corylus americana* (Frost).

(To be continued.)

DR. SEYMOUR HADWEN.

It will be regretted by many Entomologists and others throughout Canada that Dr. Seymour Hadwen, Pathologist of the Health of Animals Branch, Dominion Department of Agriculture, tendered his resignation and left Ottawa about the middle of June. He is to be congratulated, however, on being appointed Chief Pathologist of the United States Biological Survey. Dr. Hadwen, accompanied by Dr. Nelson, Chief of the Biological Survey, sailed for Alaska, from Seattle, on July 1st, to undertake a series of studies on the diseases affecting the reindeer and caribou. Dr. Hawden will have several technical assistants with him, and a complete laboratory outfit from Washington accompanied the party. Their headquarters will be about one hundred miles inland from Nome.—Adapted from the "Entomological Branch News Letter."

NEW COLEOPTERA. IX.

BY H. C. FALL,
Tyngsboro, Mass.

OMOPHRON Lat.

O. decoloratum, sp. nov.

Broadly oval, form nearly as in *robustum*, size a little larger than the latter, color above testaceous, beneath brown fading to yellow at the margins; markings similar in form and position to those of *robustum* except that the transverse frontal plaga is not produced forward at middle, the sutural stripe is not dilated before the apex, and they are throughout of a pale brownish tint, without trace of metallic lustre. The surface throughout is polished and strongly shining, the elytral striæ fine, entire and set with rather distant punctures.

Length 6.7 to 6.9 mm.; width 4.5 to 4.6 mm.

Described from three examples bearing label Gray Co., Kansas, July 9–15, 1917. Specimens were sent me by Mr. W. Knaus, who received them from the University of Kansas. The type is a female.

This species falls with *pallidum* and *robustum* by Casey's table.* *Pallidum* differs distinctly by its smaller size and dull alutaceous lustre, in which it resembles *gilæ*. *Decoloratum* is more nearly allied to *robustum*, but the pale, washed-out and rather small and indefinite markings, which are not at all due to immaturity, readily distinguish it.

In the Canadian Entomologist—1909, p. 276—Casey describes *O. brevipenne* from Ohio specimens. As its author remarks, this is the species which generally goes as *robustum* in collections. A careful comparison of Ohio specimens with the type of *robustum* shows them to be practically identical in all respects. The unique type of *robustum* was described as coming from Nova Scotia, but so far as I know no other specimens have been taken in that region, and I very much doubt the correctness of the locality; in any case it is quite certain that the Ohio specimens are the same thing.

HETEROCERUS Fab.

Among a lot of miscellaneous Manitoban things recently sent for determination by Messrs. Wallis and Criddle, I find two undescribed species of this genus. It is especially noteworthy that both belong to the subgenus *Littorimus*, of which Horn recognized but a single representative in his Synopsis of the North American species. Opportunity is taken to make known two other undescribed species, one of them a *Littorimus*, which have stood in my collection for many years.

H. minutus, sp. nov.

Very small; entire body and appendages testaceous, the head sometimes feebly infuscate; pubescence short, pale, marginal fringe short. Head and thorax densely, very finely punctate; elytra finely punctate, the punctures separated by about their own diameters, the interspaces excessively minutely punctulate. Prothorax (♂) strongly transverse, evidently wider than the elytra, sides moderately arcuate, not narrowed in front, with the usual apical and basal constrictions, base not visibly margined. Elytra without trace of striæ, but with a broad sulcus extending tending backward from the intrahumeral

*Coleopt. Notices VII, p. 301.

impression, becoming gradually evanescent behind the middle. Metasternum without mesocoxal line, epipleuræ without raised line at base.

Length 1.6 mm.

Luling, Texas, three examples taken by the writer July 4–6, 1893. Two of the three specimens are quite surely males, judging from the broad parallel-sided prothorax; the third has the thorax equal in width to the elytra, but is scarcely more narrowed in front than in the other two; it may be a female. The type is a male.

This minute species is obviously closely related to *pusillus* but the size is conspicuously smaller, the base of the thorax is unmargined, and the male shows no trace of the mandibular lobe which is characteristic of *pusillus*. Horn describes *pusillus* as having the mesocoxal line, but says it is indistinct. There is absolutely no trace of the line in any one of my specimens.

H. mundulus, sp. nov.

Pale flavo-testaceous throughout, elytra with a small, vague fuscous shade behind the scutellum, the labrum also more or less infuscate; pubescence fine short, concolorous, the marginal fringe inconspicuous; entire upper surface very finely densely punctulate. Prothorax moderately transverse, equal in width to the elytra (♂) or slightly wider (♀), with the sides feebly arcuate and subparallel, basal sinuation not distinctly margined. Elytra without striæ. Body beneath finely densely punctulate, metasternum often a little infuscate. Mesocoxal line indistinct but usually traceable, no epipleural line; stridulating ridge of first ventral segment complete.

Length 2.6–2.9 mm.

El Paso, Texas. Nov. 13, 1889. Twelve examples.

This pallid little species together with the much larger *H. pallidus* were seen in abundance on the wing just before sunset in the dry, sandy bed of the Rio Grande on the above-mentioned date. It is only recently that I have discovered the species to be a *Littorimus*. There is very little difference in the form of the thorax in the specimens before me, and I feel somewhat uncertain as to the sexes. In one or two the thorax and head seem slightly larger than the rest, and it is probable that these are males. The metasternal intercoxal process is barely as wide as the coxal width in this species, much narrower than in the other species of *Littorimus*.

H. moleculus, sp. nov.

Form oblong, obtuse at the extremities, as in *auromicans;* colour piceous, sides and median line of prothorax obscure testaceous, elytra with irregular, often interrupted pale fasciæ of the usual type, which vary greatly in development; pubescence very fine, short, yellowish and recurved on the elytra, darker and erect on the prothorax, margin not fimbriate with longer hairs. Head and thorax densely minutely punctulate, elytra with a dual punctuation consisting of relatively coarse punctures separated by their own diameters on the average, the interspaces very minutely punctulate. Prothorax nearly twice as wide as long, as wide as the elytra in the female, just perceptibly wider in the male, sides nearly parallel, feebly narrowed apically, sides of base a little oblique, and very distinctly margined. Elytra not at all striate. Body beneath piceous, legs, tip of prosternal lobe, pro- and epipleuræ and margins of ventral seg-

ments testaceous; mesocoxal and epipleural lines present; stridulating ridge of first ventral entire.

Length 2.2–2.4 mm.

The type bears label "Aweme, Man. 3–IX–1917, M. Criddle." Other examples from Mr. Criddle and Mr. Wallis from same locality bear date 15–VII.

This very small species resembles considerably in miniature *auromicans*, but aside from the size differs in its somewhat finer pubescence and in the character of the elytral punctuation. In *auromicans* the elytral punctures are sensibly equal in size throughout and finer than the coarser punctures of *moleculus*. The pale elytral markings in *moleculus* are usually broader and more confluent, such that frequently they might better be described as testaceous, with base and some detached spots piceous.

H. canadensis, sp. nov.

Similar to the preceding species, except as follows: Size larger, length 3.3 mm., colour piceous except for two narrow sinuous elytral fasciæ and small subapical spot; the propleura and sides of ventral segments obscurely paler; legs entirely dark; pubescence longer, the recurved hairs of the elytra mixed abundantly throughout with short erect hairs; margins of prothorax and elytra distinctly fimbriate. The very fine interstitial punctures of the elytra are fewer and less evident and the larger punctures more conspicuous than in *moleculus*.

Described from a single female specimen taken at Thornhill, Manitoba, I–VII–16 by Mr. J. B. Wallis. Type in my collection.

The four species of the subgenus *Littorimus* now known to me may be easily separated by the following table:

Colour pale testaceous without markings; middle coxæ separated by a distance subequal in width to that of the coxa; base of thorax not margined at sides; epipleuræ without oblique raised line at base; length 2.3–2.9 mm.....*mundulus*.

Colour piceous; elytra fasciate; middle coxæ separated by a distance distinctly greater than the width of the coxa; base of thorax very distinctly margined at sides; epipleural line present.

Margins of body distinctly fimbriate with longer hairs; elytra with abundant intermixed short erect hairs; legs dark; length 3.3 mm.....*canadensis*.

Margins of body not fringed with notably longer hairs; elytral pubescence recurved or recumbent; legs entirely or in great part pale.

Size very small (about 2.3 mm.) elytral punctuation dual....*moleculus*.

Size much larger (3. to 4. mm.) elytral punctures nearly uniform in size.....*auromicans*.

OLIGOMERODES Fall.

O. delicatulus,, sp. nov.

Form narrow, cylindrical, body piceous, clothed with short ashy appressed pubescence, legs and antennæ brown. Antennæ (♂) very slender, nearly as long as the entire body, first joint relatively stout, arcuately subcylindrical, about twice as long as wide, joint 2 obconic, half as long as the first, 3–8 narrower

and of equal width, not in the least serrate, 3–5 decreasing in length, 3 a little longer than wide, 5 wider than long, 6–8 strongly transverse and compactly joined, 9–11 extremely slender and elongate, 9 about 6 times as long as wide and fully as long as the preceding joints combined, 10 a little longer and feebly arcuate throughout its length, 11 straight, still longer, 9–11 combined nearly as long as the elytra. Head deflexed, finely sparsely punctate; eyes round, prominent. Prothorax about as wide as long, convex, disk a little gibbous profile, side margins narrowly flattened, subparallel medially, narrowed a little anteriorly posteriorly sinuately curved into the rounded base, the edge finely serrulate anteriorly, surface finely, not closely punctate. Elytra scarcely wider at base than the prothorax, 2½ times as long as wide, disk with feebly impressed rows of fine punctures, the striæ a little deeper at sides. Legs, especially the tibiæ and tarsi, very slender, basal joint of hind tarsus scarcely as long as the next two, fourth tarsal joint not perceptably emarginate.

Length 2.85 mm.; width .9 mm.

Described from a single male specimen taken at San Diego, California, 7–16–1909, by Mr. George H. Field.

Although very different in facies from the two known species of this genus, because of the smaller size and more slender build, there is really little upon which to found a new genus, the most conspicuous feature being the extreme length of the three outer joints of the male antennæ. In this connection it should be remembered that there are numerous instances of marked variation in antennal structure within generic limits in this family, and in the genus Oligomerodes the two known species differ appreciably in this respect, the antennæ in *catalinæ* vary considerably from *occidentalis* in the direction of the present species.

HADROBREGMUS Thoms.

H. subconnatus, sp. nov.

Elongate, parallel, moderately convex, brown, opaque, with short, fine, sparse yellowish appressed pubescence. Second and third joints of antennæ smallest, the latter narrower, joints 4–8 subequal, not quite as wide as long, 9–11 subequal to all the preceding in the male, joint 9 about 2½ times as long as wide and a little longer than the two preceding, joint 10 similar to 9 but scarcely as long, 11 three times as long as wide. In the female joints 9–11 are a little shorter than all those preceding, 9 and 10 each scarcely twice as long as wide. Prothorax, when viewed at right angles to the plane of its side margins, is obviously though not greatly wider than long, suboctagonal in outline, sides straight and nearly parallel medially, obliquely narrowed before and behind, the posterior obliquity sinuate, hind margin evenly arcuate, front margin with a short, feeble median sinuation; surface, like that of the head, finely rugulose and feebly granulose; front angles, posterior margin and median line impressed. Elytra slightly wider at base than the prothorax, sides feebly sinuate before the middle, slightly dilated posteriorly, apex rather narrowly truncate; disk punctate-striate, the interspaces finely rugulose, subequal in width to the striæ, nearly flat toward the suture, a little convex laterally. Body beneath alutaceous and minutely punctulate; ventral segments subconnate at middle, first segment short, 2–4 subequal, 5 longer; last two ventral sutures anteriorly arcuate, the

last more distinctly so. Tarsi slender, basal joint slightly shorter than the two following united, 2–4 subequal, 5 a little longer.

Length 3.25 to 4.5 mm.; width 1.35 to 1.9 mm.

Described from a series of six specimens sent me by Mr. Norman Criddle, who took them at Aweme, Manitoba, 7–VI–1919, in rotten spruce. The type is a male in my own collection; paratypes in Mr. Criddle's collection, these probably to be deposited in the national collection at Ottawa.

Because of the partially connate ventral segments, the present species cannot with strict propriety be referred to Hadrobregmus, in which the ventral segments are perfectly free. Furthermore, the prothorax lacks the postmedian dorsal compression or gibbosity common in varying degree to all species of Hadrobregmus, and presents somewhat the aspect of a Coelostethus, so that strictly speaking, it would occupy a place between these two genera, under a new generic title; but since in all other essentials it is in close accord with Hadrobregmus, I prefer for the present to leave it there, placing it at the end of the genus.

A NEW CALIFORNIA METHIA.

BY J. O. MARTIN,
Berkeley, California.

The genus Methia is so sparsely represented in the collections of California coleopterists and in fact in most collections elsewhere, that I am going to submit the following description of an unique example which appears to differ from any of the yet described species. The specimen on which the following description is based was taken by myself on the desert side of the San Bernardino mountains near Hesperia at the junction of Deep Creek with the Mojave River. It came to my camp light just after a thunder storm.

Methia falli, sp. nov.

Body varying in colour from rufo-castaneous on the head to piceous on the abdominal segments; moderately to sparsely covered with pale yellowish pubescence. Head rufo-castaneous, markedly darker than the disc of the prothorax; front granulose punctate; occiput shining and coarsely variolately punctate, punctures extending more sparsely along the caudal margin of neck, which is shining, and behind the lower lobe of the eye strigose. Eyes large, separated above by about the width of the third antennal joint, deeply emarginate, the upper and lower lobes connected by but two rows of facets.

Antennæ one-half longer than body, rufo-testaceous, gradually slightly darker toward tip; pubescence erect on basal joints becoming decumbent toward the tip; joints three to eleven gradually decreasing in length. Prothorax rufo-castaneous, granulate, moderately constricted at base and apex, sides broadly and evenly rounded. Elytra three-fourths the length of abdomen; lighter in colour than the prothorax, vaguely clouded with black on basal third, more strongly so at the evenly rounded tips; surface granular, dull; bicarinate, the carinæ not meeting and extending but two-thirds of length.

Legs of same colour as elytra. Abdomen nigro-piceous, evenly, sparsely, coarsely punctured. Length 7 mm.

The above like *aestiva* Fall, has the second antennal joint visible but very small.

Falli is more nearly like *aestiva* Fall, than any of the other species of this genus, but differs from it in its darker colour and smaller size; in having the eyes more widely separated on the vertex and the upper lobe of the eye more flattened; also in the possession of the punctured area on the occiput, and the more evenly and broadly rounded outline of the lateral prothoracic profile. In *aestiva* there is a pronounced tooth at the tip of the basal joint of the antennæ which is lacking in *falli*. Type in my own collection.

I take pleasure in naming this species for my friend Mr. H. C. Fall, whose help and kindness has been an inspiration in much of my entomological work.

UROCERUS FLAVICORNIS, FABRICIUS.

This species, which is very similar to the European *Urocerous gigas* Linn., ranges over all parts of Canada. There are the following records of its occurrence, based for the most part upon the work of Bradley and Kirby. It is found from Siberia and Alaska, south along the Pacific Coast to British Columbia, Oregon and along the Rocky Mountains to Arizona and New Mexico, and even Mexico; is unknown from California, and in Colorado, Utah, Arizona and New Mexico is confined to high altitudes. The single record from Nebraska is undoubtedly based upon an individual carried into the State as a larva or pupa in lumber shipped from the Canadian or Hudsonian life zone. This is not different from the record from England upon which Stephens based his species, *bizonatus*. In the east this species extends south from Keewatin through Labrador, Newfoundland, Nova Scotia, Northern New York, New Hampshire and Massachusetts. Specimens have been reported from the Adirondacks, Ithaca, White Mountains, and a small male from Connecticut. Provancher records the species from Canada, presumably Quebec. In the central region it has been reported from Cape Krusenstern, Arctic Regions, Fort Churchill, Hudson Bay, St. Martin's Falls, Albany River and Mackenzie River. I am writing the above to bring the records of distribution together and to record a specimen received from Mr. F. Johansen, which was collected by the Rev. I. O. Stringer along the Mackenzie River in 1896. This specimen comes from the Royal Ontario Museum of Toronto.

ALEX. D. MACGILLVRAY.

In the Royal Ontario Museum there are specimens of *Urocerus flavcornis* also from Spruce Brook, Nfld.; Godbout, Que., and Edmonton, Alta. The specimens from the last-named locality were taken by Mr. F. S. Carr, the others by the writer. The species was apparently common at Godbout, on the north shore of the lower St. Lawrence, near the Gulf.

E. M. WALKER.

Mailed eptember 1st, 1920.

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POPULAR AND PRACTICAL ENTOMOLOGY.

Some Winter Insect Life.

BY RALPH HOPPING,
Vernon, B. C.

The cabin was a ranger station in the foothills of the Sierras, five miles from a small town called Dunlop, in Fresno County, California. In August the hillside close to the northern side of the cabin was dry, the grass was yellow, and even the brush a few rods away had a parched look. No insect life stirred in the dry, hot atmosphere. The winter rains, however, changed all this. By February everything was transformed. The hillside close to the cabin was green and numerous flowers were beginning to bloom everywhere. A great many insect holes appeared among the grass stems. These were of various shapes and sizes. The ranger, who was also an entomologist, was curious. So one Sunday, assisted by his deputy, an investigation began. Ant hills were common. The unknown possesses a lure much greater than the known. We merely noted that two species had homes on the hillside. Four other varieties of freshly-made holes invited our attention. Two were about three-eighths of an inch across with ant-like mounds around the entrance. The earth pellets, however, were of two kinds, one fine and granular, the other conglomerate, irregular masses composed of twelve to twenty grains of earth. The former proved to be a spider. Spiders are "common" to a coleopterist. We were not interested. The latter type of hole, however, produced a female *Bradycinetus horni*, Rivers. The next hole produced a male. Once we found the male and female in the same hole. In all we collected thirty-two specimens in holes of varying depths of from six to twelve inches. This is a rare species. We almost forgot the other holes, one of which was a horizontal slit in the hillside about three-eighths of an inch high and one and a fourth to one and a half inches in length. On the lower edge extended the "dump" of fine particles of earth, much like that at the mouth of a mining tunnel. These slits were not few. They existed in hundreds. Exploring the mountainside in all directions gave the same result. They were everywhere. The burrows extended horizontally an inch or two, and then perpendicularly for about eight inches. We explored half a dozen and each gave up a nice, fat blue-black scorpion. Thousands in our dooryard and we had lived there two years and had not seen them! We still had one other variety of hole. This was larger than any we had explored, about an inch across. One to one and a half inches below the surface the hole was plugged with earth. This plug was one to two inches thick. Below was an opening, a hole somewhat larger in diameter than the portion above the plug. We followed the hole down twenty-eight inches and found a round, fat, female *Pleocoma fimbriata*, Lec. She was reddish in colour, shiny, and lay on her back feebly waving her legs. That day we dug twenty-four from a varying

depth of eighteen to thirty inches. Always these holes were in the red soil. Suddenly I realized why I found so many holes in this red soil dug by foxes: "Mrs. Pleocoma" undoubtedly made a fine part of "Mr. Fox's" meal.

Many times I had caught the males of this species, a black, shiny beetle about one-half the size of the female, flying in the dusk during a slight drizzle. The females seldom if ever come out of the ground, the males only during the winter months or wet season. At such times the air was full of them, appearing like swarms of bees. But let the drizzle stop or let it actually begin to rain and, presto! they were gone. They only fly in the winter months after the first few soaking rains. This general habit of flying only in the winter and during a fine drizzle at dusk is common not only to *Pleocoma fimbriata* but to *Pleocoma behrensii*, Lec. and to *Pleocoma hoppingi* Fall, and probably to all the Pleocomas.

The underground life is all around us, but few of us know anything about it. We have eyes but we do not see.

ALBERTAN COLEOPTERA.

BY F. S. CARR,
Edmonton, Alberta.

Cicindela repanda edmontonensis, new variety.

Type to be deposited in the National Collection at Ottawa, labeled Edmonton, Alta. 21—VIII—19; F. S. Carr, collector; female.

Length 12.75 mm. The colour is dark brown with narrow elytral markings; the humeral and apical lunules are widely separated from the side margin, the dot of the oblique line being broken off that line. The humeral angles of the thorax are cupreous and the sulci blue, the blue fading out where the sulci join the median line. The under surface of the thorax is bright cupreous and of the abdomen shining green, the under surface being covered with long white pubescence.

The head is much narrower than the thorax, coarsely strigose, and with the front sparsely hairy. The elytra are punctate, each puncture having a shining granule.

This variety is another in that complex centering about *repanda* Dej., a complex characterized by a development of colour pattern along two directions. In one the elytral markings become heavier and more crowded, producing *bucolica* Csy. and *unijuncta* Csy.; in the other the markings become fainter, producing *edmontonensis* Carr and *hudsonica* Csy. All five varieties have been taken on the banks of the Saskatchewan River at Edmonton, *bucolica* and *unijuncta* being the most abundant.

Diplochila undulata, new species.

Type to be deposited in the National Collection at Ottawa, labeled 10-V-19. Edmonton, Alta.; collected by F. S. Carr; male.

The head is black, the palpi and antennæ piceous, the palpi being testaceous at the ends. The thorax is much wider than long, wider at the base than at the apex, widest at the anterior third. The posterior angles are obtuse, the basal impressions single, deep, linear, the median impression defined medially but obsolete anteriorly and posteriorly. The thorax is smooth. The elytra

are the same width at the base as the thorax, then widen out to the anterior sixth, then run parallel to the posterior fourth, from which the sides curve to the suture, the apex being sinuate. The intervals are interrupted by shallow transverse wrinkles most deeply incised where the intervals dip to the striæ; the striæ possess traces of punctures at rare intervals; the seventh stria is almost obsolete.

Length 13 mm.

This species is described from a series of six specimens all taken at Edmonton. The writer had for comparison a series of *obtusa* Lec., one from Edmonton and three from Mr. Chagnon, Montreal. From *obtusa* it is easily distinguished by its size and the appearance of the elytra, which somewhat resemble those of *Amara interstitialis* Dej.

Chlaenius frostii, new species.

The type is to be deposited in the National Collection at Ottawa, labeled 11–V–18, Edmonton, Alta.; collected by F. S. Carr; male.

Length 9 mm. The colour is black beneath, slightly violaceous above, darker on the head and thorax, polished and shining. The antennæ are piceous with the first joint pale, the palpi are black with the tip almost white, the terminal joint being dilated and truncate. The labial palpi are more dilated than the maxillary palpi. The head is smooth. The thorax is widest at the base gradually becoming narrower towards the apex, the base of the thorax and the elytra being the same width. The anterior angles are broadly rounded, the posterior obtuse. The impressions are double, wide, shallow and punctured coarsely, the punctures being separated by their own diameter. The median impression is defined as a narrow impressed line fading out anteriorly and posteriorly and bordered on each side by a row of punctures. The remainder of the surface is sparsely punctured with the exception of the base, which is punctured like the impressions.

The basal line of the elytra meets the lateral line at an angle. The striæ are clearly impressed and punctured and are wide apart, the intervals being flat and shining. The punctures of the intervals are coarse, being about 3½ punctures to the greatest width of any interval, and occurring in lines arranged more or less transversely. The punctures on the first interval are at most in two rows. The scutellar stria is short and deeply impressed. The abdomen is coarsely, shallowly and sparsely punctate and sparsely pubescent with short, yellow pubescence. The prosternum is coarsely and sparsely punctate; the mesosternal episternum and the metasternum are cribrate.

The describer has given this species the name *frostii* as an indication that he appreciates the great amount of assistance given him by Mr. C. A. Frost. In connection with this species Mr. Frost kindly loaned a specimen of *purpuricollis* Rand, that had been compared with the material in the Leconte and Harris collections.

This species is most closely related to *purpuricollis*. It is most readily distinguished by the following table:

frostii	*purpuricollis*
elytra shining	elytra opaque from small, transverse lines.
punctures coarse	punctures small

This species is described from a series of five, all taken in the Edmonton district.

Elleschus borealis, new species.

The type will be deposited in the National Collection at Ottawa. It is labeled 24–V–19; Edmonton, Alta.; collected by F. S. Carr.

Length 2.8 mm. The colour is red, the eyes alone being black, and is covered with white pubescence except for a denuded area behind the middle, stretching from the second interval to the margin and back to the top of the declivity. The beak is shining, shorter than the head and thorax, punctate, the punctures being coarse and well separated; the second joint of the antennæ is longer than the third, the median line on the thorax is raised in the middle only, the pubescence diverging from it to the sides, which are rounded. It is widest at the anterior third. The elytral striæ are finely impressed and punctate with coarse punctures closely placed.

This species seems to be closely allied to *bipunctatus* Linn., but is distinguished by its colour. It has been described from a large series taken on willow.

ADDENDUM.

Mr. F. A. Sherriff has kindly sent a specimen of *Chlaenius purpuricollis* Rand. This was received since the descriptions were prepared. It agrees with the specimen loaned by Mr. Frost. This specimen was also taken in Mass.

A BIBLIOGRAPHY OF THE LITERATURE ON THE DESCRIBED TRANSFORMATIONS AND FOOD PLANTS OF NORTH AMERICA SPECIES OF AGRILUS (COL.).

BY C. A. FROST AND H. B. WEISS.
New Brunswick, N. J.

(Continued from page 210.)

A. politus Say.

Blatchley, Col. Ind. p. 801, 1910.
Chittenden, Bul 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.
Childs, Mo. Bul. Cal. Hort. Comm., Vol III, pp. 150–155, 1914.
Felt, N. Y. St. Mus. Bul. 200, p. 37, 135, 1917.
Frost, Can. Ent., Nov., p. 386, 1916.
Hamilton, Tr. Am. Ent. Soc., Vol. XXII, p. 364, 1895.
Hopkins, Bul. 32, W. Va. Agric. Exp. Sta., p. 184.
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Lugger, Psyche, Vol. IV, p. 203, 1884.
Manee, Ent. News, Vol. XXIV, pp. 167–171, 1913.
Smith, Ins. N. J., p. 295, 1909.

This species is known as the oak twig-girdler. Spiral shaped burrows are made in the soft-growing tissues of the twig, and encircle it from four to seven times (Childs). Infests green bark on living willow trees (Hopkins). Common on *Salix obtusifolia* (Hamilton). On willow (Manee) (Blanchard). On hazel (Bruner). On *Salix* and *Corylus americana* and *C. rostrata* leaves (Frost). On oak and willow (Blatchley) (Smith). Breeds in living willow and striped maple (*Acer pennsylvanicum*) (Knull). Forms galls on twigs of white thorn (*Cratægus*) (Felt).

A. burkei Fisher.

Fisher, Can. Ent., Vol. 49, p. 287, 1917.

Larva mines inner bark and wood of normal, injured and dying white alder (*Alnus rhombifolia*) and paper-leaf alder (*A. tenuifolia*) (Fisher).

A. viridis L. var. **fagi** Ratz.

Weiss, Jour. Econ. Ent., Vol. VII, p. 438, 1914.

Weiss, Ent. News, Vol. XXVII, p. 426.

The larva of this species works in the stems of roses, making a spiral band of channels and causing a swelling or gall over the infested part. Theobald states that *viridis* attacks beech, alder, birch, aspen, oak.

A. sinuatus Oliv.

Banks, U. S. D. A., Div. Ent., Bul. 34, n. s., 1902.
Beach, Lowe, Stewart, Bull. 170, N. Y. Agric. Exp. Sta., pp. 381–445, 1899.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.
Felt, Proc. 24th An. Meet. Soc. Prom. Agric. Sci., pp. 39–48, 1903.
" 31st Ann. Rept. St. Ent. N. Y., p. 78, 1915.
" Bul. 200, N. Y. St. Mus., p. 134, 1917.
Howard, Ins. Life, Vol. VII, pp. 258–260, 1894.
Lugger, Bull. 66, Minn. Agric. Exp. Sta., pp. 85–331, 1899.
Parrott & Glasgow, N. Y. Sta. Circ. 44, 1915.
Slingerland & Crosby, Man. Fr. Ins., p. 230, 1914.
Smith, Ins. Life, Vol. VII, p. 189.
" Ins. Life, Vol. VII, pp. 258–260.
" Garden & Forest, pp. 373–374, 1894.
" Garden & Forest, p. 448, 1894.
" 15th Ann. Rept. N. J. Agric. Exp. Sta., pp. 423–600, 1894.
" Amer. Agric. 26, Jan., p. 85, 1895.
" Bul. 109 N. J. Agric. Exp. Sta., 1895.
" An. Rept. N. J. Agric. Exp. Sta., pp. 365–526, 1895.
" N. J. Ent. Rept., 1900.
" N. J. Exp. Sta. Bul. 155, 1902.
" N. J. Ent. Rept., 1901.
" Ins. N. J., p. 295, 1909.
" N. J. Ent. Circ., 28.
" N. J. Bd. Agr. Rept. 37, p. 188, 1910.
Webster, Bul. 77, Ohio Agric. Exp. Sta., pp. 33–52, 1897.
Weiss, Jour. Econ. Ent., Vol. VII, p. 251, 1914.
" N. J. Dept. Agr. Circ. 24, p. 5, 1918.

This species is the sinuate pear borer. Eggs are deposited in crevices and under flakes of bark, and the resulting slender, whitish larvae construct narrow winding burrows in the sap wood, the courses of these channels being indicated exteriorly by the discoloured and abnormal bark over them. On young trees this discoloured bark splits or raises into a welt.

A. fallax Say.

Blatchley, Col. Ind., p. 802, 1910.
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.

Hopkins, Bul. 32, W. Va. Agric. Exp. Sta., p. 184.
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Stromberg, Can. Ent., Vol. XXVI, p. 36.

Occurs on locust and oak (Blatchley). Adults reared from dead branches of honey locust (*G. triacanthos*) (Kirk). Beaten from oak (Stromberg). Habits similar to those of *egenus* (Chittenden). Infests bark and wood of dying branches of hackberry (*Celtis occidentalis*) (Hopkins). Reared from honey locust (Fisher).

A. crataegi Frost.

Frost, Can. Ent., Vol. XLIV, p. 247, 1912.

Bred from dead, fallen, trunk of *Crataegus* (Fisher & Kirk). Beaten from *Cratægus* (Liljeblad).

A. obsoletoguttatus Gory.

Blanchard, Ent. Amer., Vol. IV, p. 32 (*interruptus*).
Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900 (*interruptus*).
Harrington, 27th Rept. Ent. Soc. Ont., p. 71, 1896 (*interruptus*).
Knull, Ent. News, Vol. XXXI, p. 10, 1920.
Stromberg, Can. Ent., Vol. XXVI, p. 36.

Reared from dead branches of beech (*Fagus americana*), blue beech (*Carpinus caroliniana*), ironwood (*Ostrya virginiana*), red oak (*Quercus rubra*), and hickory (Knull). Probably breeds in oak (Blanchard). On oak (Chittenden). Found on beech, birch and hickory (Harrington). On red and laurel oaks (Stromberg). On red oak leaves (Frost). On dead beech (Morris).

A. scitulus Horn.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.

Reared from huisache (Schwarz).

A. ornatulus Horn.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.

Breeds in huisache (*Acacia farnesiana*) (Schwarz).

A. subcinctus Gory.

Knull, Ent. News, Vol. XXXI, p. 11, 1920.

On poison ivy (*Rhus toxicodendron*) (Wenzel).

A. abstersus Horn.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.

Reared from twigs of *Acacia greggii* (Hubbard & Schwarz).

A. lecontei Saund.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.
Knull, Ent. News, Vol. XXXI, p. 11, 1920.
Lugger, Psyche, Vol. IV, p. 203, 1884.
Stromberg, Can. Ent., Vol. XXVI, p. 36.

Breeds in dead wood of hackberry (*Celtis occidentalis*) (Knull). On hackberry (Chittenden), (Schwarz), (Stromberg).

A. abductus Horn.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.

On *Quercus arizonica* (Hubbard & Schwarz).

A. palmacollis Horn.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.

Reared from twigs and branches of mesquite (*Prosopis juliflora*) and huisache (*Acacia farnesiana*) (Schwarz).

A. felix Horn.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.

Reared from *Parkinsonia microphylla* (Hubbard & Schwarz).

A. impexus Horn.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.

Stromberg, Can. Ent., Vol. XXVI, p. 36.

Occurs on the two locusts *Gleditschia triacanthos* and *Robinia pseudacacia* (Stromberg).

A. floridanus Crotch.

Blatchley, Can. Ent., Vol. LI, p. 29, 1919.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.

On *Quercus* (Schwarz). Swept from huckleberry and other low shrubs (Blatchley).

A. addendus Crotch.

Blatchley, Col. Ind., p. 804, 1910.

Taken from peach trees in blossom (Blatchley).

A. lacustris Lec.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900 (*cuneus*).

Bred from *Croton capitatum;* also occurs on *Croton eleagnifolium* (Schwarz).

A. imbellis Crotch.

Blanchard, Ent. Amer., V, p. 32, 1889.

Chittenden, Bul. 22, n. s., U. S. D. A., Div. Ent., p. 68, 1900.

Occurs on *Helianthemum canadense* (Blanchard).

A. egenus Gory.

Blatchley, Col. Ind., p. 804, 1910.

Chittenden, Ent. Amer., Vol. V, pp. 217–220, 1889.

" Bull. 22, n. s., U. S. D. A., Div. Ent., p. 67, 1900.

Garman, Bien. Rept. St. For. Ky. 2, pp. 32–63, 1915.

" Bull. 200, Ky. Agric. Exp. Sta., p. 124, 1916.

Glover, Rept. U. S. Comm. Agric., pp. 65–91, 1870, 1871.

Hamilton, Trans. Am. Ent. Soc., Vol. XXII, p. 364, 1895.

Knull, Ent. News, Vol. XXXI, p. 11, 1920.

Packard, 5th Rept. U. S. Ent. Comm., p. 291, 1890.

" 5th Rept. U. S. Ent. Comm., p. 372, 1890.

Smith, Ins. N. J., p. 295, 1909.

This species infests locust mining under bark and twigs of smaller branches, the beetles eating the leaves. Reared from hickory (*Hicoria alba*) (Chittenden). Reared from *Robinia neomexicana* (Hubbard & Schwarz). On willow (Smith). Bred from Virginia creeper (Kirk). Garman states that the beetles have a singular way of chewing the edges of locust leaflets so as to give them a rough appearance, which however is so slight as to be easily overlooked. Knull states that *egenus* has been confused with *celti* in collections so that in view of this, some of the above records may apply to *celti*.

A. celti Knull.

Knull, Ent. News, Vol. XXXI, p. 11, 1920.

Reared from dead branches of hackberry (*Celtis occidentalis*) (Kirk & Knull).

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA). PART X.

BY CHARLES P. ALEXANDER,
State Laboratory of Natural History, Urbana, Illinois.

Ormosia frisoni, sp. n.

Closest to *O. meigenii* (O. S.); inner pleural appendage of the male hypopygium with a conspicuous lateral spine; all four gonapophyses of approximately equal size and shape.

Male.—Length 3–3.5 mm.; wing 4–4.5 mm.

Female.—Length 3.8–4 mm.; wing 4–4.8 mm.

Rostrum and palpi dark brown. Antennæ brownish black; flagellar segments oval, provided with a dense white pubescence and rather elongate verticils. Head yellowish grey.

Pronotum brown, the scutellum pale whitish yellow. Mesonotum uniformly brownish gray with a sparse yellowish bloom; pseudosutural foveæ conspicuously oval, black; tuberculate pits conspicuous, separated from one another by a distance a little greater than the diameter of one. Pleura light plumbeous. Halteres whitish. Legs with the coxæ plumbeous; trochanters light brown; femora brownish yellow, the tips broadly darkened; tibiæ and tarsi dark brown. Wings with a strong brownish gray tinge; stigma darker brown; conspicuous whitish areas before and beyond the stigma; basal cells largely whitish; veins dark brown. Venation: cell *1st* M_2 open by the atrophy of the outer deflection of M_3; anal veins convergent.

Abdomen dark brown, including the hypopygium. Male hypopygium with the inner pleural appendage smaller than the outer, before the tip with an acute black spine set at a right angle to the appendage; outer appendage strongly curved, the tip acute. Gonapophyses four in number, black, of approximately equal size and shape, the inner pair a little more slender than the outer pair; outer apophyses with a tiny tooth at about two-thirds the length on the inner face; inner apophyses with the basal half flattened, the distal half strongly narrowed; penis-guard slender, pale in colour. Ninth sternite with a spatulate lobe as in the group.

Habitat.—Illinois.

Holotype.—♂, Muncie, May 15, 1920, (Alexander).

Allotopotype.—♀, (Frison).

Paratopotypes.—1 ♂, May 8, 1920, (Frison); 32 ♂♀'s, May 15, 1920, (Alexander & Frison).

Type in the collection of the Illinois State Natural History Survey.

Ormosia frisoni bears a considerable resemblance to *O. meigenii* (O. S.) but is readily told by the smaller size, differently coloured wings and, especially, by the structure of the male hypopygium. In *O. meigenii* the inner pleural appendage has the tip narrowed into a chitinized point that is in a straight line with the axis of the appendage; of the four gonapophyses, the inner pair are approximately one-half longer than the outer pair. This interesting new species is dedicated to the collector, my friend, Mr. Theodore H. Frison.

This species occured near the margin of a prairie cat-tail swamp where it was associated with *Pseudolimnophila luteipennis* (O. S.) and *Tipula dejecta*

Walker. The flies were generally observed in small swarms among a dense growth of *Equisetum hiemale* that covered the embankment.

Ormosia notmani, sp. n.

General coloration dark brown, the praescutum without stripes; wings grayish subhyaline, the stigma slightly darker brown; cell *1st* M_2 open by the atrophy of the outer deflection of M_3; basal deflection of Cu_1 very oblique in position, inserted beyond the fork of *M; 2nd Anal* vein bent toward the *1st Anal* on its outer end only; male hypopygium complicated; outer pleural appendage a black, three-spined structure; inner pleural appendage slender, deeply bifid; gonapophyses slender, the distal end slightly widened, each apophysis with a long, powerful spine at the base.

Male.—Length about 3.8 mm.; 4.4 mm.

Rostrum and palpi dark brown. Antennae slightly elongated, dark brown, the scapal segments a little paler; flagellar segments long-oval, provided with a dense, erect, white pubescence. Head brownish gray, provided with long, yellow bristles.

Pronotum brown, the scutellum obscure yellow. Mesonotum dark brown, sparsely dusted with a grayish yellow pollen; pseudosutural foveae conspicious, oval, black. Pleura brown, sparsely dusted with gray. Halteres light yellow. Legs with the coxæ and trochanters light yellow; femora light brown, brighter basally; remainder of the legs darker brown. Wings grayish subhyaline; stigma slightly darker, brown; wing-base a little brighter; veins dark brown. Venation: *r* less than its own length beyond the fork of R_{2+3} on R_2; cell *1st* M_2 open by the atrophy of the outer deflection of M_3; basal deflection of Cu_1 a short distance beyond the fork of *M*, very oblique in position, the branches of *Cu* forming an angle of about 100°; *2nd Anal* vein with the extreme outer end bent toward the *1st Anal.*

Abdomen dark brown, the hypopygium a little brighter. Male hypopygium somewhat as in *O. bilineata* Dietz and *O. subcornuta* Alexander but very distinct in the details of structure. Outer pleural appendage a short, squat, chitinized structure that terminates in three acute blackened points, the two outer ones short and sub-equal, the inner spine much longer, acute; inner pleural appendage long and slender, almost straight, profoundly bifid, the two arms lying generally parallel, the one arm appearing as a long, blackened spine with the proximal face microscopically serrulate, the other, more dorsal, arm slightly paler, sparsely setigerous. Gonapophyses shaped as slender blades, the outer ends a little flattened and expanded, at the base of each with a powerful, semi-erect spine that is about one-third the length of the apophysis. Ninth sternite with a conspicuous fleshy spatulate lobe as in the *meigenii* group of species.

Habitat.—New York.

Holotype.—♂, Keene Valley, Essex Co., May 26, 1920, (Notman).

Type in the collection of the author.

This remarkably distinct species is dedicated to the collector, Mr. Howard Notman, whose conscientious and capable efforts have added numerous species, in many orders, to the list of New York insects.

Limnophila (Eulimnophila) imbecilla illinoiensis, subsp. n.

Male.—Length 6 mm.; wing 6–6.5 mm.

Very similar to typical *imbecilla* Osten Sacken but very much smaller (in *imbecilla*, the wing of the male measures 8.2–8.5 mm.). Head yellowish with scarcely any gray pruinosity. Wings grayish yellow.

Habitat.—Illinois.

Holotype.—♂, Homer Park, June 13, 1920 (Frison).

Paratopotypes.—Two ♂'s.

Type in the collection of the Illinois State Natural History Survey.

Paratypes in the collection of Mr. Frison and the writer.

Tipula tennessa, sp. n.

Allied to *T. ultima* Alexander; wings brownish yellow, the dusky spot at the end of the vein *2nd A* small; abdominal tergites with a narrow, dark brown median line; male hypopygium with the ninth tergite small, the caudal margin with a broad, U-shaped median notch, the lateral lobes obtusely rounded with the margins smooth, on the ventral face with a sharp chitinized spine.

Male.—Length about 16.5 mm.; wing 18.5 mm.

Generally similar to *Tipula ultima*, differing as follows:

Antennæ with the basal flagellar segments distinctly bicolorous, the basal enlargement of each segment dark brown, the remainder of each segment paler yellowish brown, the distal flagellar segments more uniformly brown.

Coloration of the thorax identical in the two species. Wings with a deep, brownish yellow suffusion, as in *ultima*, the dusky spot at the tip of vein *2nd A* very restricted but evident. Venation: cell R_2 more acutely pointed at base; cell *1st* M_2 long and narrow; petiole of cell M_1 shorter than *m*.

Abdominal tergites dull yellow with a distinct but narrow median vitta of dark brown; lateral margins of the tergites less distinctly darkened; sternites yellow. Male hypopygium with the sclerites fused into a continuous ring as in *ultima*. Ninth tergite small, the caudal margin with a broad, U-shaped median notch, the lateral lobes thus formed broadly and obtusely rounded, their margins unarmed; on the ventral face of each of these lobes a conspicuous, chitinized spine directed ventrad and slightly caudad and proximad; on the middle line beneath a narrow chitinized ridge that is slightly bifid at the cephalic end. Inner pleural appendage small, flattened, the distal end curved into a spoon-shaped structure. Ninth sternite profoundly notched, at the base of the incision with a flattened, recurved lobe that is sparsely provided with short hairs; on either side of this rectangular lobe, a somewhat similar lobe whose inner or proximal margin is provided with numerous, long, yellow bristles that become more elongated near the distal end; from the base of each of these subtending lobes, a flattened digitiform lobe extends dorsad; from the region of the pleurite a similar lobe is found, lying parallel to the last, the notch between them very narrow.

Habitat.—Tennessee.

Holotype.—♂, Knoxville, May 17, 1915, (G. M. Bentley).

Type in the collection of the Department of Entomology, University of Tennessee.

It will be seen from the above characterization that the hypopygium is very

distinct from that of *Tipula ultima*, where the ninth tergite is deeply notched, the lateral lobes very large, flattened, directed proximad and with the margins provided with numerous tiny chitinized denticles; all the other lobes and appendages of the hypopygium are much smaller and less complicated than in *T. ultima*. It should be noted that the present species is on the wing during May whereas *T. ultima* is a characteristic autumnal species.

Tipula lygropis, sp. n.

Allied to *T. occidentalis* Doane; general coloration dark yellowish gray, the mesonotal præscutum with four brownish gray stripes; wings with a very strong brown suffusion, the obliterative streak unusually broad and conspicuous; abomen obscure brown; male hypopygium with the ninth tergite with a deep, V-shaped notch; eighth sternite with two submedian pencils of long yellow hairs.

Male.—Length about 20 mm.; wing 21 mm.

Frontal prolongation of head dark brown, still darker laterally; no evident nasus, only a tuft of long hairs at this point; palpi brown, the basal two segments lighter in colour. Antennæ dark brown, the scapal segments slightly paler brown. Head brownish gray, the occiput darker; the vertex with indistinct lines that are concentric from the occiput.

Mesonotal praescutum yellowish gray with four brownish gray stripes, the intermediate pair narrowly separated for most of their length by a line of the ground colour, the ends contiguous; scutum light gray, the lobes largely dark gray; scutellum pale yellowish gray with a capillary brown median line, the lateral portions dark; postnotum yellowish gray, the posterior margins darker. Pleura dull gray, more yellowish gray before the base of the halteres. Halteres dark brown, the base of the stem brighter. Legs with the coxæ dull gray, the outer face sparsely yellow pollinose; femora and tibiæ reddish brown, narrowly tipped with dark brown; tarsi brown. Wings with a very strong brownish tinge; cells *C* and *Sc* more yellowish brown; cells *M* and *Cu* adjoining vein *Cu* more yellowish; a conspicuous brown spot at the end of *Sc* and another including the stigma; a paler brown seam at the origin of *Rs*, along the cord and at the tip of vein Cu_2; a very conspicuous white obliterative streak extending from cell *C* across cells *1st* R_1, the end of *R*, the basal two-fifths of cell *1st* M_2, into the base of cell M_3. Venation: R_{2+1} shorter than the distal section of R_2; petiole of cell M_2 a little more than one-half of *m*.

Abdomen obscure brownish, the tergites very indistinctly trivittate with still darker brown, the distal segments more uniformly darkened; sternites brownish gray. Male hypopygium moderately large. Ninth tergite with a very deep V-shaped median notch that extends almost back to the eighth segment; the lateral lobes have the ventral edge produced into a flattened, chitinized blade, the tips running out into small, chitinized points. Ninth pleurite rather conspicuous, conical, the apex obtusely rounded but flattened; outer pleural appendage conspicuous, rather stout, dark brown, clothed with long, dark hairs. Ninth sternite with a profound notch that is narrowly margined with pale, from its dorsal proximal angle hang two long, pendulous lobes. Eighth sternite with a broad, U-shaped notch, on either side of the median line of the base of the notch, a pencil of very long yellow bristles; lateral lobes produced

proximad into very broad-based triangular lobes that are directed proximad. the proximal margin sparsely provided with bristles, the tip narrowed.

Habitat.—California.

Holotype.—♂, Santa Cruz Island, May 16, 1919, (E. P. Van Duzee).

Type in the collection of the California Academy of Sciences

Tipula pseudotruncorum, sp. n.

General coloration light gray; antennæ short, dark brown; head with a linear brown mark; mesonotal praescutum with five more or less distinct brown lines; a capillary brown median line extending from the suture to the base of the abdomen; wings pale brown, variegated with dark brown and subhyaline blotches; abdomen buffy brown, the tergum with three conspicuous dark brown longitudinal stripes.

Male.—Length 15 mm.; wing 16 mm.

Female.—Length 20 mm.; wing 17.5 mm.

Frontal prolongation of the head long and slender, light gray; palpi dark brown. Antennæ short, the first segment elongate, dusted with gray; second scapal segment brownish; flagellum black, the segments short with the basal swelling indistinct. Head light gray with a conspicuous elongate brown mark.

Mesonotal praescutum light gray, conspicuously marked with dark brown; median stripe light gray, split by a capillary brown line, the lateral margins of the stripe more broadly dark brown; all three of these lines are confluent before the suture; lateral praescutal stripes dark, the area between them and the median stripe infuscated; scutum light gray with two isolated grayish brown marks on each lobe; remainder of the mesonotum light gray, a capillary brown line extending from the suture to the base of the abdomen. Pleura light gray. Halteres brownish yellow, the knobs dark brown. Legs with the coxæ light gray; trochanters grayish brown; femora black, more reddish basally; remainder of the legs black. Wings brown; stigma dark brown; a small, dark brown spot at the origin of *Rs;* membrane conspicuously variegated with subhyaline areas, the more conspicuous situated before and beyond the stigma, immediately before the origin of *Rs;* a conspicuous white blotch at the base of cell *M* and another at about two-thirds the length of the cell; indistinct whitish areas in cells *Cu* and *1st A*. Venation: *Rs* long; cell *1st* M_2 long and narrow; petiole of cell M_1 shorter than *m*.

Abdomen with the first tergite light gray; remaining tergites buffy brown, with three broad dark brown stripes that are narrowly interrupted at the base and apex of each segment; lateral margins of the tergites broadly light gray; sternites dusted with gray. Male hypopygium rather large. Ninth tergite with a broad, U-shaped notch, the lateral lobes indistinct, obtusely rounded; deep median incision that extends back to beyond mid-length of the tergite, the margins being practically contiguous. Ninth pleurite complete; outer pleural appendage tumid, gradually narrowed to the apex. Ninth sternite with a deep V-shaped notch, the lateral angles produced proximad into fleshy lobes that are contiguous on the median line, at the tip with conspicuous long yellow hairs that largely fill the notch of the sternite. Eighth sternite with the lateral angles produced into slight tumid lobes, each tipped with a pencil of long, reddish bristles, decussate across the median line.

The allotype female is much paler throughout but presumably belongs to this species; the markings on the body as well as the wings are very pale but indicated.

Habitat.—Northwestern United States.

Holotype.—♂, Longmire Springs, Mt. Rainier, Washington, altitude 2,500 feet, July 18, 1919, (Dr. C. L. Fox.).

Allotype.—♀, Paradise Valley, Mt. Rainier, altitude 6,000–8,000 feet, August 5, 1919, (Dr. C. L. Fox.).

Paratypes.—Two ♂'s, Moscow, Idaho.

Type in the collection of the California Academy of Sciences.

Tipula pseudotruncorum bears a resemblance to the European *T. truncorum* Meigen, and was distributed under this name by Prof. Doane. What is apparently this same species has been recorded by Snodgrass (Trans. Am. Ent. Soc., Vol. 30, pp. 211, 212; 1904) as *T. truncorum*. A comparison with authentic specimens of *truncorum* received from my friend, Herr M. P. Riedel, shows that the two species are abundantly distinct.

NOTES ON THE COLEOPTERA WITH DESCRIPTIONS OF NEW SPECIES.

BY C. A. FROST.
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Cicindela spreta Lec. Several years ago I prepared a note on the capture of this form in Maine, but after some correspondence with the late Mr. Edward D. Harris it was laid aside. Further interesting facts regarding this much misunderstood insect were noted in his letters which should correct the impression given by several authors that it is closely related to *purpurea* Oliv. His father, T. W. Harris, some time prior to 1848, sent Dr. LeConte a specimen taken at Eastport, Maine, and which, according to Mr. Harris, is the unique type now in the LeConte collection at Cambridge, Mass., and bears his father's label.

The original description in the "Catalogue of the Geodephagous Coleoptera" (Ann. Lyc. Nat. Hist., 1848, p. 177) begins, "*Obscure nigro-aenea subviridescens*,—", and was probably made from the specimen in the LeConte collection, as it is a green insect of about the shade of those green forms of *purpurea* which sometimes pass for *spreta*, but having the complete *limbalis* markings. The figured *spreta* on the coloured plate XIII of the above work is a black insect, and it is referred to in the LeConte Revision of the Cicindelae of 1856 (Trans. Am. Phil. Soc. XI., p. 37) under *limbalis* (as a variety of *splendida*) as, "*Nigra. C. spreta* Lec. Ann. Lyc., 4, 177; tab. 13, fig. 7", and in a few lines below, "Eastport, Maine, Dr. Harris." In the Harris collection, Boston Museum of Natural History, is one specimen bearing an "Eastport, Me.," label and the manuscript number 1502, which is referred to in the Harris manuscript catalogue as, "*Cicindela Raiana* H. ms. *spreta* Lec. Ann. Lyc. N.Y. IV. 177. Eastport, Me., Dr. J. Ray, 1836." This is the specimen referred to by Mr. E. D. Harris in a letter to me as the "companion specimen" to the one in the LeConte collection. I examined this (Harris collection) specimen, which still bears the

old Harris label, and found it much darker than the type at Cambridge. It is an almost black insect with the faintest traces of green. It is marked like the type, and is almost exactly as the figure on Plate XIII of the work of 1848. Does it not seem probable that Dr. LeConte made the description from his green specimen, and in some way the figure was made from the black specimen of the Harris collection? This supposition will at least account for the dual colour rôle of *spreta*.

In correspondence with Dr. LeConte, T. W. Harris expressed the opinion that *spreta* was much nearer *limbalis* Klug. than *purpurea*, and that Dr. LeConte was in accord with him is shown by the Revision of 1856.

In 1900, Mr. E. D. Harris took a large series (about 100 specimens) of *limbalis* at Mt. Desert, Me., and, discovering several dark green ones among them, took one to Cambridge and placed it beside the type, and then to the Harris collection where he made a comparison with the "companion specimen." His conclusion was, "It is, to all intents, exactly the same thing. It is *limbalis*."

On June 24, 1909, I took a specimen of *spreta* at Monmouth, Me., in a sparsely wooded pasture on the west shore of Lake Cobbosseecontee. It has been placed beside the type and found to be the same in every respect. Another specimen from Wales, Me., June 15, 1909, is very much like Mt. Desert *limbalis*, with reddish-cupreous shading and silky lustre. A specimen from Monmouth, June 25, 1905, is nearly intermediate between the other two, being a more clear green at the base of elytra and becoming gradually cupreous towards the apex, but without definite silky lustre.

From the above we have sufficient proof that *spreta* Lec., a rather dark green insect (of about the shade of the green forms of *purpurea*) with *limbalis* markings, (humeral, post-humeral and ante-apical dots, sinuate median fasciæ, and apical lunules) is but a colour variation of *limbalis* Klug. as represented by the Mt. Desert specimens. Therefore, Dr. Walther Horn is in error in the Genera Insectorum in placing "*spreta* Lec., 1848" as a "senile form" and *spreta* Lec., 1856, as a "black form" of *purpurea* Oliv.

Cicindela hentzi Dej., var. **niveihamata**, n. var. This interesting variation was taken at the Middlesex Fells Reservation in a road near the shore of Spot Pond in the town of Stoneham, Mass., July 26, 1903. It was found somewhat remote from the usual haunts of the species, although they frequently scatter from the ledges to the neighboring roads. The markings of this unique are formed by the extension of the apical lunules along the margin, including the ante-apical marginal spots, to and joining with the obliquely transverse median fasciæ; the result is a broad marginal band with sinuate inner edge terminating in a hook at the middle of each elytron. The median ante-apical dot has almost vanished and the humeral lunule is represented by a small humeral dot and a very faint sub-humeral one. The markings resemble those of the posterior half of the elytra of *C. schauppi* with the transverse fasciæ more oblique. In order to stimulate ambition and anticipation among those collectors who delight in aberrant forms this handsome little insect is duly christened as above.

Pterostichus corusculus Lec. This species, which has hitherto been taken rarely along a railroad embankment through a swamp, was found in large numbers (over 100) under stones, logs and in debris along the shores of

the Charles River in Medfield, Mass., April 19, 1919. There had been a heavy rain which flooded the meadows where these little insects evidently abound, and drove them to shelter along the river bank.

Elaphrus olivaceus Lec. Two specimens of this pretty swamp-loving species were taken at Monterey, Mass., July 9, 1919, in a dark, forbidding wood through which ran a small brook between low and muddy banks at the spot where they occurred. *E. cicatricosus* was also present at this place which was partly covered with dead branches; these did not improve the conditions under which they were taken by the usual method of treading about in the mud and keeping a close watch of the surface for any moving object.

Coccidula occidentalis Horn. A specimen was given me by Mr. H. M. Parshley, who took it at Orono, Maine, May 31, 1914, by sweeping in a meadow. It is almost exactly like several specimens from Edmonton, Alberta, taken by Mr. F. S. Carr, who, as usual, generously shared his catch with me. These were taken June 14 and 26, 1917. One of the characters given by Dr. Horn in his description of the species (Trans. Am. Ent. Soc. XXII, p. 114) is the black colour of the first two segments of the abdomen, these being yellow at the sides in *lepida* Lec. There are traces of yellow at the sides of the second segment on some of the Alberta specimens, and the Maine specimen shows a larger yellow area there. The habitat of the species is given by Horn as Wyoming to Vancouver.

A number of specimens of *C. lepida* were taken along a swollen brook in the debris washed down by the spring draining of a cranberry bog in Sherborn, Mass., May 23, 1908, and May 16, 1909. They could not be found on following years nor have they been taken elsewhere. The discal spot of the elytra in some of these specimens shows a tendency toward the cordiform shape of *occidentalis*, but there is no indication of a sutural stripe connecting it with the scutellar spot as in that species.

Buprestis sulcicollis Lec. In the "Review of the Genus Buprestis in North America," by Nicolay and Weiss (Jour. N. Y. Ent. Soc., Vol. XXVI) there appears the statement, on the authority of Dr. E. C. VanDyke, that the type "is not a brassy green insect as claimed by Casey, but of a uniform dull, coppery brown with a very slight greenish reflection." As I have examined the unique type four times, and on the last three occasions with special reference to the colour, I feel justified in recording that the statement gives an erroneous impression. With a good light on the specimen, Col. Casey's remarks (Studies in the American Buprestidæ), which are practically a copy of the original description, are correct. On a dark day the green is not so much in evidence, but if the sun is shining it is really a brilliant insect. It is especially green on the head and thorax, while the punctures between the rugæ of the elytral intervals are almost a golden green at the sides, becoming darker on the disk; the whole under side of the specimen is a bright brassy green. The only parts that are not green are the elytral costæ and the smooth places of the pronotum, which are a very dark bronze with greenish reflections. The appearance of the type is that of a wholly verdigris-green insect in which the colour is as fully and completely developed as in the type of *Chrysobothris verdigripennis*, and

some specimens of *Dicerca tuberculata*. My single specimen of this species is a bronze colour very similar to the dark forms of *Buprestis striata*, and is probably very near to the form *lateralis* Casey. The costæ are a greenish black, and the punctures along the striæ are a bright green set in the bright coppery rugæ of the intervals; it lacks the greenish shading of the type on the under side.

Chrysobothris orono, n. sp. Size and form of *verdigripennis*. Black with the punctured areas of a grayish-green colour, beneath cupreous or bronzed with the prosternum, femora, and sutures of the abdomen greenish. Antennæ bright metallic green, last joint and the lobes of the preceding seven, black. Clypeus arcuately emarginate with sides rounded, front greenish, coarsely, densely punctured and pubescent with two small median callosities; eyes rather widely separated above.

Prothorax not quite twice as wide as long, slightly wider at base than at middle, briefly rounded and narrowed at apex, slightly sinuate at middle, and with a very small sinuation before the hind angles, which are rectangularly acute and not narrowed; median dorsal sulcus limited in front by strong angulate costæ, which broaden out at middle and disappear behind; a short sinuate callosity at middle on each side.

Elytra widest behind and sinuate in front of middle, more convex than *scabripennis*, sutural costæ entire from apex to basal fourth and more strongly elevated than any of the others which are indicated by flattened, smooth, black areas and lines, punctured areas not as well defined as in *scabripennis* and *verdigripennis*, basal foveæ less evident.

Abdomen with sparse, shallow punctures and indistinct callosities, last ventral body semicircularly emarginate, last dorsal coarsely, sparsely punctured with a small, indistinct notch; prosternum not lobed, very densely pubescent and punctate, sides with coarse, sparse punctures and broad, interlacing, smooth spaces, the dense white pubescence extends along the median line on to the metasternum gradually becoming more sparse; front femora with a strong, serrulate, acute tooth; tibiæ with a large apical dilatation nearly one-third the length of the tibia, sinuate at the distal end, rising in an arc and terminating rather abruptly without sinuation; front and middle tibiæ strongly arcuate, hind tibiæ straight.

Length 14.5 mm., width 6 mm. at apical third.

The unique type is a male from Orono, Maine, July 4, 1908, in my collection. The species is dedicated to the Indian chief Orono, from whom the town where it was taken is named.

The species most nearly resembles *verdigripennis* superficially, but is distinct by the dark antennal joints, the much different tibial dilatation, and the straight hind tibiæ. In the coloration of the dorsal surface and in the tibial dilatation it resembles *carinipennis*, but in no other respects. From *trinervia* it differs in the shape of the thorax, tibial dilatation, elytral sculpture, size and last dorsal segment of abdomen.

(To be continued.)

NEW SAW-FLIES FROM MAINE AND NEW YORK (HYMENOPTERA).

BY ALEX. D. MacGILLIVRAY.
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All the adults of the following species were reared from larvæ. They are published at this time in order that the names can be used with descriptions of the larvæ.

Pteronidea evanida, n. sp.—Female. Body black with the following parts rufous: supraclypeal area, clypeus, labrum, mandibles, occipital and vertical orbits, extending onto the caudal aspect of head, collar, femora, profemora and mesofemora more or less irregularly infuscated, protibiæ, mesotibiæ, protarsi, mesotarsi, abdomen on segments one to six; trochanters whitish; ocellar basin sharply marked with vertical walls, dorsal side of frontal crest three sided; supraclypeal area elevated; median fovea longer than broad, deep, prominent; clypeus faintly semicircularly emarginate; antennæ with third, fourth and fifth segments subequal; head, mesonotum, mesoscutellum, and mesopleuræ dull, finely setaceous; wings hyaline, veins including costa reddish, stigma darker, margined with rufous; saw-guides with dorsal margin straight, ventral margin strongly convex, oblique, prominent point at dorsal angle. Length 7 mm.

Male.—Male differs in having median fovea longer, legs and collar lighter in colour, and abdominal segments one to five and lateral portions of six rufous.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Subs. 119, 111, 134.

This species is near *fulvicrus* Prov., but the two species are distinguishable by the form of the median fovea.

Pteronidea edura, n. sp.—Female. Body black with the following parts whitish: supraclypeal area, clypeus, labrum, mandibles in part, mouth-parts, collar, tegulæ, and legs beyond the middle of the coxæ, except the distal half of metatibiæ and metatarsi; following parts rufous: edge of frontal crest, occipital and vertical orbits faintly, caudal portion of first abdominal segment, second to sixth segments entirely, and cephalic part of sixth segment; ocellar basin moderately distinct; frontal crest rounded, unbroken, three-sided on dorsal margin; median fovea distinct, long, wedge-shaped depression; clypeus broadly angularly emarginate; antennæ with third and fourth segments subequal, fourth segment longer than fifth; mesonotum dull, setaceous, mesoscutellum polished, mesopostscutellum densely punctulate; wings hyaline, dotted with numerous black spinulæ, veins black, proximal portion of costa paler; saw-guides with dorsal margin concave, ventral margin convex and converging toward dorsal margin, distal end bluntly pointed. Length 8 mm.

Habitat.—Ithaca, New York, H. Yuasa. No. 8.45(?)^{c}–1–1.

This species runs to *lombardæ* Marl., but is differently coloured from the female of that species.

Pteronidea effusa, n. sp.—Female. Body black with the following parts yellowish white: supraclypeal area, clypeus, labrum, mandibles, mouth-parts, collar broadly, tegulæ, and legs beyond distal ends of coxæ, except infuscated distal half of metatibiæ and the black metatarsi; following parts rufous: frontal crest, occipital and vertical orbits, lateral third of lateral lobes of mesonotum indistinctly, and abdominal segments one to seven except small cephalic

margin of first segment, and mesal spots on caudal margin of sixth and seventh segments; ocellar basin deep, distinct; frontal crest prominent, unbroken, curved on dorsal margin; median fovea shallow, elongate oval; clypeus broadly, shallowly emarginate; head dull, sparsely setaceous; mesoscutellum polished, mesonotum dull, caudal margin of mesopostscutellum punctured with small calices; mesopleura polished; antennæ with third and fourth segments subequal, fourth segment distinctly longer than fifth; wings hyaline, spinulæ inconspicuous, rufous, veins and costa and stigma in great part rufous; saw-guides with dorsal margin concave, ventral margin convex, converging toward distal end. Length 8 mm.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Sub. 110.

This species is similar to *edura* MacG., but the form of the frontal crest will separate them.

Pteronidea effeta, n. sp.—Female. Body black with the following parts yellowish white: clypeus, labrum, supraclypeal area, mouth-parts, collar, tegulæ, caudal angles of lateral lobes of mesonotum, and legs beyond coxæ except distal half of metatibiæ and metatarsi; following parts rufous: caudal portion of first abdominal segment, segments two to six entirely, most of seventh, frontal crest, and occipital and vertical orbits; clypeus broadly deeply emarginate; supraclypeal area swollen; median fovea elongate, linear, comparatively deep; frontal crest distinct, slightly broken, dorsal margin curved; ocellar basin distinct, not deep, open around median ocellus; each side of lateral ocelli depressed; surface for most part polished; mesonotum including mesoscutellum and mesopostscutellum polished, roughened with distinct calices of minute setæ; antennæ with third segment slightly longer than fourth, fourth and fifth subequal; wings hyaline, veins and stigma and costa rufous; saw-guides robust, dorsal margin concave, ventral margin convex, distal portion oblique, bluntly pointed above. Length 10 mm.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Sub. 158.

This species runs to *populi* Marl., but the topography of the head will separate the two species.

Pteronidea emerita, n. sp.—Female. Body black with the following parts yellowish: labrum, clypeus, supraclypeal area, mandibles, mouth-parts, collar, tegulæ, and legs except distal three-fourths of metatibiæ and metatarsi; following parts rufous: frontal crest, occipital and vertical orbits, and abdominal segments one to six; clypeus broadly, shallowly emarginate; median fovea a large, slightly depressed, triangular area; frontal crest strong, narrow, unbroken, ocellar basin deep, open about median ocellus, strongly elevated above postocellar area; antennæ with third segment longer than fourth, and fourth distinctly longer than fifth; head and thorax polished, with numerous minute setæ, mesoscutellum bare, mesopostscutellum with caudal margin roughened; wings hyaline, veins and costa and stigma reddish; spinulæ point-like, black; saw-guides with straight dorsal margin, convex ventral margin, converging convex distal portion, blunt distal end. Length 9 mm.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Sub. 139.

This species is very similar in general appearance to *effeta* MacG.

Pteronidea erudita, n. sp.—Female. Body black with the following parts yellowish: labrum, clypeus, mandibles, supraclypeal area, collar, tegulæ,

lateral half of each lateral lobe of the mesonotum, and legs beyond middle of coxæ except distal third of metatibiæ and metatarsi; following parts rufous: frontal crest, occipital and vertical orbits, and abdominal segments two to seven; clypeus broadly, shallowly emarginate; median fovea elongate, shallow, furrow-like; frontal crest broken, high adjacent to meson, low on lateral portions, dorsal margin two sided; ocellar basin shallow, flat, open about median ocellus, hardly raised above postocellar area; antennæ with third, fourth, and fifth segments subequal; head and thorax polished, with closely-placed calices of fine setæ; mesopostscutellum roughened; wings hyaline, veins and costa and stigma reddish; saw-guides narrow, dorsal margin straight, ventral margin convex, distal portion straight and convergent, pointed. Length 7 mm.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Sub. 12.

This species is similar to *effeta* MacG. and *emerita* MacG. The colour of the mesonotum will distinguish them.

Pteronidea edita, n. sp.—Male. Body black with the following parts yellowish: clypeus, labrum, supraclypeal area, mandibles, genal orbits, pronotum broadly, tegulæ, legs except metacoxæ and distal end of metatibiæ and metatarsi, and caudal margin of abdominal terga and venter entirely; following parts rufous: occipital and vertical orbits broadly, frontal orbits narrowly; median fovea deep, broad, longer than broad; antennæ with third segment slightly longer than fourth and latter slightly longer than fifth; frontal crest obscure, broken; ocellar basin shallow, flat, lateral walls distinct but narrow and low; head and thorax dull with numerous subadjacent calices; mesopleura, particularly ventral portion, with numerous short, white setæ; caudal margin of last sternum angularly emarginate; wings hyaline, stigma with costal portion dark, remainder yellowish, costa yellowish, veins blackish. Length 6 mm.

Habitat.—Ithaca, New York. H. Yuasa. No. 5[1]–1–6.

This species runs to *ventralis* Say, but the difference in their coloration will differentiate them.

Pteronidea exacta, n. sp.—Male. Body black with the following parts white: labrum, clypeus, supraclypeal area, mandibles, mouth-parts, genal orbits, collar broadly, tegulæ, and legs except a fuscous ring on distal end of metatibiæ; following parts rufous: occipital and vertical orbits broadly, frontal orbits narrowly; clypeus roundly, shallowly emarginate; supraclypeal area not prominent; median fovea a small, rather deep pit; frontal crest fairly strong, unbroken, transverse, straight; ocellar basin shallow, lateral walls hardly elevated, surface flat, open between ocelli, and not as high as postocellar area; antennæ with third segment slightly longer than fourth, and fourth slightly longer than fifth; head and thorax setaceous; mesoscutellum polished, mesopostscutellum somewhat roughened; procidentia short, rounded, strongly convex; wings hyaline, veins and costa and stigma yellowish. Length 4.5 mm.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Sub. 172.

This species is similar to *dubia* Marl., but the length of the third antennal segment will separate them.

Pteronidea equina, n. sp. Female. Body black with the following parts yellowish white: supraclypeal area, clypeus, labrum, mandibles, mouth-parts, genal and occipital and vertical orbits broadly, frontal orbits narrowly,

orbital markings more brownish than others, antennæ for most part, collar, tegulæ, mesopleuræ for most part, mesosternum, sides of mesoscutellum, legs except distal portion of metatibiæ and metatarsi, venter of abdomen entirely, caudal margin of abdominal terga, becoming successively broader on caudal terga, caudal tergum entirely, and saw-guides except tips; clypeus narrowly roundly, emarginate; median foveæ broad, round depression with sloping sides; frontal crest narrow, distinct, unbroken, dorsal margin two-sided; ocellar basin distinct, flat, lateral walls narrow, sharp, and distinct; postocellar area not depressed below ocellar basin; head and thorax setaceous; mesopostscutellum setaceous, not roughened; wings hyaline with numerous spinulæ, veins and stigma and costa yellowish; saw-guides with dorsal margin straight, ventral margin straight, distal portion oblique, convex, bluntly pointed above. Length 5.5 mm.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Sub. 71.

This species runs to *kincaidi* Marl. Its coloration is distinctive.

Pteronidea enavata, n. sp.—Female. Body rufous with the following parts black: small, transverse area surrounding ocelli, small spot on caudal margin of postocellar area, antennæ, mesal area of median lobe of mesonotum, mesopostscutellum in great part, metascutellum, ring on metatibiæ, and cephalic band, narrower on caudal segments, on abdominal terga; following parts whitish: labrum, pronotum, tegulæ, and legs in great part, except tarsi; clypeus broadly emarginate, almost truncate; median fovea pit-like, deep; frontal crest broken by oblong depression bearing median fovea, two-sides, angular; ocellar basin flat, roughened, limiting lateral walls narrow, not strongly raised; antennæ with third and fourth segments subequal, fifth shorter; head and thorax dull, setaceous; wings yellowish, veins and costa and stigma pale, spinulæ not prominent; saw-guides with dorsal margin straight, ventral margin convex, distal portion oblique, pointed at distal end above. Length 6 mm.

Habitat.—Orono, Maine. Maine Agricultural Experiment Station, Sub. 25.

This species resembles *pinguidorsum* Dyar, but they are easily separated by the difference in the form of the head ridges.

Pristiphora ostiaria, n. sp.—Female. Body black with the following parts white: labrum, mandible, mouth-parts, collar broadly, tegulæ, and legs except a spot on proximal end of metacoxæ, distal one-fourth of metafemora, distal one-third of metatibiæ, and metatarsi; antennæ with third segment longer than fourth, fourth and fifth subequal; clypeus truncate; median fovea an inconspicuous depression; frontal crest wanting; ocellar basin distinguishable, lateral walls not conspicuous; head uniformly finely punctured; occipital, ocellar, and interocellar furrows wanting; mesonotum including mesoscutellum and mesopostscutellum, polished; mesopleuræ with white setæ; wings hyaline, veins and stigma brownish, costa pale, spinulæ numerous; saw-guides narrow with dorsal margin straight, ventral margin convex, distal end oblique and blunt. Length 6 mm.

Male.—The male differs in having supraclypeal area, genal orbits, clypeus, and venter of abdomen pale; median fovea is larger and more conspicuous; procidentia is comparatively broad, flat, rounded. Length 5 mm.

Habitat.—Ithaca, New York. H. Yuasa. No. 212–1–1.

This species is near *banksi* Marl., but they can be separated by the difference in coloration.

NOTES ON GALERUCELLA NYMPHAEAE L., THE POND-LILY LEAF-BEETLE (COLEOP.)

BY HARRY B. WEISS AND ERDMAN WEST.
New Brunswick, N. J.

This species occurs throughout New Jersey on the yellow pond-lily (*Nymphaea advena* Ait.) which is common along the lower Delaware River and adjacent ditches and tide-water streams. During the seasons of 1919 and 1920, it was particularly abundant at Monmouth Junction, Westville and several other places in New Jersey, defacing the leaves and flowers and rendering them ragged and unsightly.

Blatchley[1] states that the adult probably hibernates and this appears likely as adults have been taken during the middle and last of May and early June. The yellow eggs are deposited on the upper surfaces of the leaves in clusters of 18 to 20, each egg being stuck on end to the leaf surface and close to its neighbor. MacGillivray[2] states that he found clusters containing as few as 6 eggs and gives the number as ranging from 6 to 20. These hatch in about a week, each larva emerging from the upper half of the egg and feeding takes place in colonies on the upper layers of the leaf tissue, resulting in irregular, unsightly, denuded areas. As the larvae become larger they separate and feed independently on either side of a leaf.

In the latitude of New Jersey, many become full-grown about the third week of June, pupation taking place on the upper or under leaf surface. This stage lasts about one week, the beetles appearing the last of June and first part of July. There are at least two generations in New Jersey. During the middle and last of June it is possible to find all stages of the insect except eggs.

Chittenden[3] records the adult as attacking plants belonging to botanical families not at all related to its normal food plants such as aquatic species of *Nymphaea*, *Sagittaria*, *Brasenia*, *Nuphar* and mentions basket willow and beans. He further states that it frequently has received mention under the name *Galeruca sagittariae* Gyll, and is evidently of foreign origin, being found abundantly in northern Europe, and Siberia. In this country it has been recorded from Texas, California, Oregon, Indiana and occurs from the Hudson Bay region southward to the District of Columbia and Virginia. It is, therefore, a well distributed species. Both Schaupp[4] and MacGillivray[5] have described the early stages and the latter's descriptions being the most detailed are given below together with additional material in brackets which it was thought desirable to add.

Egg.—(Length 0.9 mm. Width 0.5 mm.) "Oblong or short cylindric with smoothly, obtusely rounded ends; yellow, shining." (The surface is sculptured with hexagonal markings having depressed centres.)

Larva. (Length 7 to 8.5 mm. Width about 1.8 mm.). Head black; the antennae mere tubercles, three jointed; the labrum three-sided, the distal and lateral margins in the form of a continuous convex curve constituting one side, the remaining sides formed by the proximal end of the labrum with an angle

1. The Coleoptera of Indiana, p. 1169.
2. Bull. 68, N. Y. State Mus., 1903, pp. 325–326.
3. Bul. 54, U. S. D. A. Bur. Ent., p. 58, 1905.
4. Bul. Brook. Ent. Soc., Vol. VI, p. 54.
5. Loc. cit.

on the median line, the distal margin with a row of comb-like bristles attached to the ental surface, two long discal and two long lateral setae, the two groups forming a transverse line, and four marginal setae; the mandibles tridentate, the two inner teeth subsequal, the outer one much shorter; the thorax and abdomen black above except at the sutures and with fine whitish fuscous lines dividing the black into distinct areas—there is such a line on the meson of the notum of the three thoracic segments and a line on each abdominal segment dividing it into two parallel transverse bands, the posterior being the longer; at the end of each of these bands a subquadrangular spot, and laterad of each anterior spot another subsequal in size which bears the spiracle, and laterad of the spiracle a much larger spot as long as the width of the segment," (bearing two comparatively long hairs; the last abdominal segment bears a row of long fine hairs on the posterior edge and the dorsal black spots on this segment are fused.) "The sternum of the thorax and abdomen pale except a spot on either side of the thorax laterad of the legs and homodynamous spots on each abdominal segment (all of the foregoing spots bearing one or two hairs,) a spot on either side mesad of the spots just described (each abdominal spot bears a short hair,) and a median broad spot; and the last ventral abdominal segment with a well developed proleg, legs blackish except at the sutures." (In many specimens the lines dividing the segments are decidedly yellow giving the larva a banded appearance dorsally. In others these lines and the lines dividing the black areas are indistinct and the entire dorsal surface appears black. The ventral surface is usually yellowish and the median brownish to black spots vary in area.)

Pupa. "Length (5 to) 7 mm. Width, (2.6 to) 4 mm. Black except the sternum of the thorax and abdomen, the apical segment of the abdomen which is covered by the cast skin of the larva, the basal segments of the legs, and a median tergal line which are yellowish; the legs, wing-pads and antennae not closely joined to the body; the very young pupae are lighter (yellowish at first) in colour."

Adult. This was described by Linnaeus in 1758 (Syst. Nat. p. 376). The following redescription is by Blatchley[6].

"Oblong-oval, narrower in front, subdepressed. Piceous brown, finely pubescent; thorax dull yellow, usually with three piceous spots; side margin, apex and epipleura of elytra yellowish; under surface and antennae piceous, the basal joints of the latter partly dull yellow; legs pale. Thorax twice as wide as long, sides rather strongly angulate; front angles small, prominent, hind angles nearly obsolete; disk with median narrow depression and a larger one each side which is densely punctured and piceous; surface otherwise smooth or with a few coarse punctures. Elytra slightly broader behind, margins distinctly flattened, surface coarsely and rather closely punctate. Length 4.5-6 mm.

DeGeer as early as 1775 gave an account of this insect in *Memoires pour servir á l'historie des Insects*, vol. V, pp. 326-329, Pl. 10, figs. 1-6, and it has received attention since then from other foreign authors.

Chittenden[7] states that arsenicals are quite effective remedies in checking the beetle on willow and for aquatic plants suggests flooding together with a few drops of oil on the water to destroy the floating insects. If this is not possible

6. Loc. cit.
7. Loc. cit.

the arsenical could be applied to the infested plants either as a dust or as a spray. If applied as a spray, care should be taken not to use a pressure strong enough to submerge the pads. Plant parts well out of the water could be coated readily. It was noted that this insect was absent in areas where the pond-lilies were entirely covered by the tide each day.

A NEW GRACILARIA INJURIOUS TO AVOCADO (LEPID.).

BY AUGUST BUSCK, WASHINGTON, D.C.

Gracilaria perseæ, n. sp.

Labial and maxilary palpi ochreous shaded on the underside with black. Face light golden ochreous. Head and thorax purplish ochreous. Antennæ whitish with black annulations. Forewings light ochreous with a purplish sheen especially on dorsal half and apex: a few black scales on costa at basal fifth, a small black dot on costa near the middle, and a few scattered black scales at apical fifth seem to be constant in all the specimens before me; there are also a few scattered black scales on the dorsal margin and the extreme apex is slightly clouded with dark scales. Cilia very dark nearly black. Hind wings blackish fuscous with black cilia. Abdomen blackish fuscous above light golden yellow on the underside. Anterior tibæ thickened with blackish-brown scales; posterior coxæ and femora golden yellow with broad, black fasciae; all tarsi white with extreme tip of each point touched with light brown.

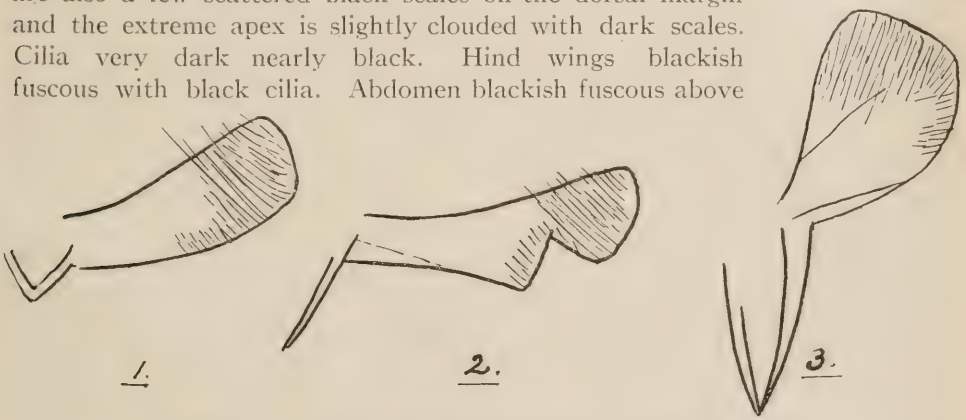


Fig. 22.—Harps of *Gracilaria perseæ* (1), *G. burserella* (2) and *G. violacella* (3).

Habitat.—Miami, Florida. U. S. N. M. Type No. 23515.

Bred from leaves of Avocado (Aquacate), *Persea persea*, at Miami, Florida, during July by Mr. G. F. Moznette, who states that the species is seriously destructive to the young growth. The larvæ are typical of the genus; they first make a small mine between the veins of the young leaves, and subsequently fold the tip or the sides of the leaf downwards. The cocoon is white, narrow, oblong, and is spun in a fold on the leaf.

The species is typical of the genus; in coloration it is similar to and intermediate between *G. violacella* Clemens and *G. burserella* Busck, but the male genitalia are so different in the three species as to indicate that they are not truly closely allied. The outline sketches of the harps suffice to separate the three species. The vinculum of *perseæ* is unusually short for the genus, and the harps are straight oar-shaped (Fig. 1), very different from the deeply-notched harps of *burserella* (Fig. 2), and the broadly-curved harps of *violacella* (Fig. 3): the last form is the more common in the genus.

BOOK REVIEW.

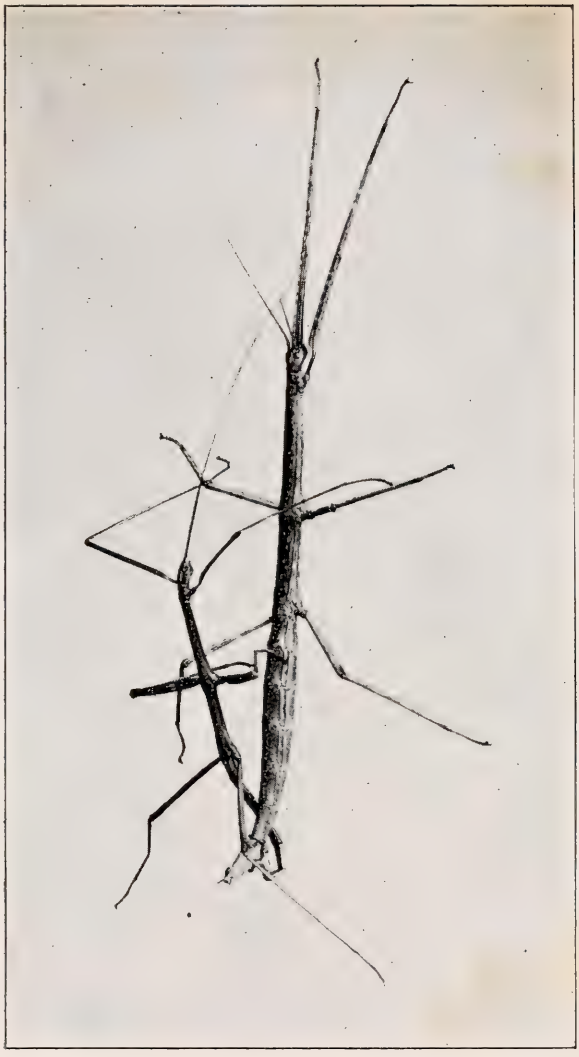
THE USE OF CARBON BISULPHIDE AGAINST THE WHITE GRUB. By W. H. W. Komp. Soil Science, Vol. X, No. 1, pp. 15–28. Miscellaneous Soil Insecticide Tests by J. J. Davis, Soil Science, Vol. X, No. 1, pp. 61–72, pls. 1, 2, 1920.

The above two papers, which are of entomological interest, have recently appeared in Soil Science, a journal devoted to soil physics, soil chemistry and soil biology. While they are clearly within the field of soil biology, it is doubtful if they will reach the eys of many entomological readers and, for such a reason, it was thought advisable to prepare this brief notice. Mr. Komp's paper deals with the determinations of the maximum dosage of carbon bisulphide noninjurious to such plants as blue-grass and clover, the minimum dosage fatal to the grub, and the influence of temperature and moisture conditions upon the effectiveness of the fumigation. Presumably, *Lachnosterna* larvæ were used. A detailed account of the experiments is given together with tables showing air and soil temperatures, dosages, effect of carbon bisulphide on plants and percentages of grub mortality, using different dosages at different depths and distances in the soil. Mr. Komp concludes that the maximum dosage for ordinary lawn and golf-grasses appears to lie somewhere between 1 and 5 ounces per square foot and considerably above the former, while the minimum dosage for the white grub is about 1 ounce, also that temperature exerts a decided influence on the minimum dosage for the white grub (1 oz. at 65 degrees F. and less than 1 oz. at 85 degrees or above). The injections should not be much over six inches apart. The soil moisture must be medium (10%) to wet (20%) for good results. In addition the charge of carbon bisulphide should be placed several inches below the point where the grubs are working. A limiting factor in the use of carbon bisulphide against the white grub in situations in which it cannot be reached by cultural methods is its relatively high cost. According to the tables in Mr. Komp's paper, the number of larvæ used in a single experiment varied from 2 to 4, and the mortality figures or percentages are based on these numbers. These appear to be far too small to insure any degree of certainty in the results.

The second paper by Mr. Davis reviews briefly the results obtained by various workers using such soil insecticides as carbon bisulphide, sodium cyanide, potassium cyanide, hydrocyanic acid, calcium cyanamide and kerosene emulsion against various soil infesting insects. In addition, he gives the results of his own field tests with such materials as kerosene emulsion, creosote preparations, corrosive sublimate, sulphuric acid, acetaldehyde, Kopper's solution, and especially sodium cyanide against the grubs of *Popilia japonica*. Tables are presented showing rates of application per acre, areas treated, areas examined, dates of treatment and percentages of mortality. After summarizing the present knowledge of the effect of treatments of cyanide and of cyanide in combination with ammonium sulphate on soil, Mr. Davis concludes that while many isolated experiments have been made to determine the possible use of sodium cyanide as a soil insecticide, the entire study lacks continuity, and that until a consistent and continuous program of work is inaugurated, very little in the way of definite results can be expected.

October, 1920 HARRY B. WEISS, New Brunswick, New Jersey.

Mailed October 30th, 1920



Diapheromera femorata Say.—Pair in copula (natural size) and egg (greatly enlarged).

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POPULAR AND PRACTICAL ENTOMOLOGY.

Walking Sticks.

BY C. B. HUTCHINGS,
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Walking Sticks belong to the Order of Orthoptera and are classed under the family Phasmidae, the members of which present a great variety of form. It may be said without exaggeration that the Phasmids exhibit some of the most peculiar, curious objects to be found anywhere in natural history. Among this strange group of insects are those that resemble leaves of trees, lichen-covered bark, stems of grasses and sticks; and so faithfully are these protective characteristics portrayed that an observer may readily be deceived by them even when actually aware of the presence of the insect. It may be worthy of passing notice to mention here that to the Phasmids belong some of the largest insects known. In the Tropics, where both sexes develop wings they attain their greatest size, six inches being a common length.

The particular species to which this paper refers is popularly known by a variety of names such as "stick insect," "stick bug," "specter," "prairie alligator," "devil's horse," "devil's darning needle," etc ; the correct name, however, is the thick-thighed walking stick, an appropriate one given by reason of the remarkably dilated femora.

It was during the summer of 1918, while engaged on an oak-borer problem in Queen's Park, Aylmer, Que., ten miles northwest of Ottawa City, that the writer came upon a number of thick-thighed walking sticks, (*Diapheromera femorata* Say), defoliating oak, basswood and hazel. Several specimens were collected for the purpose of making a closer study of the life-history of these extraordinary insects and of obtaining notes on egg records, feeding, general habits and other biologic data. Observations were continued during 1919, and the results of the two seasons work are briefly recorded in this paper.

Ecology. The particular locality where most of the collecting was done was in a thickly wooded lot covered with a mixed growth, for the most part red oaks, but also containing a considerable proportion of maple, ash, basswood, hazel, hickory, ironwood, beech, elm, service-berry and large numbers of sumach and hawthorn. Here small, green, young nymphs of the walking stick were often to be found during June wandering about on the ground over dead leaves and mosses, trying to locate some convenient twig or trunk of a suitable host plant to crawl upon; or, what was more frequent, would be seen on the trunks of the oaks, awkwardly and lazily plodding their way upwards over the roughened bark to the tender, green leaves above, where not only abundant food awaited them, but also excellent protection from enemies was afforded by means of their deceptive colouration. Searching carefully under the large basswood leaves, and by moving quietly among the under growth many specimens of half-grown nymphs

could be located clinging to the twigs and branches, their presence not always being detected at first sight on account of the odd similarity of their long thin bodies and legs to the twigs and branches they were on, a protective resemblance of quite a remarkable character. When disturbed they would often drop suddenly to earth or nervously jerk themselves this way and that; if irritated they exhibited a queer habit of swaying or rolling from side to side, cradle-fashion. Both sexes were taken, but females proved more abundant. Several pairs *in copula* were observed on oak later in the season during August and September.

Egg. This exceedingly odd and interesting object may readily be mistaken for a seed of some kind. In fact one may favourably compare it with that of hemp, so closely does it resemble this product of the vegetable kingdom both in size and shape. It is for the most part black in colour, and highly polished, with a dull whitish keel, shading to olive tints; oval in shape, flattened slightly on the sides and quite hard. At one end is the operculum or capsule, a circular cover which is dark amber in colour, deeply wrinkled and surrounded with a crown of spines, below which a dark oval ring is arranged somewhat obliquely. An oblong scar appears on the whitened area, which is very much like the hilum of a bean.

Nymph. The young nymph is bright green in colour, slow-moving and very awkward. When first hatched the body is about 5/16 of an inch long, and is of a yellow-green cast; legs and antennae are prominently long and eyes noticeably dark brown. It often happens that some difficulty is experienced in emerging from the egg, and it is not an uncommon sight to find the egg shell attached to one of the hind tarsi being dragged about by the young stick. This may be due to a lack of moisture, for if a drop of water is placed on the shell the creature soon extricates itself. The swaying or rocking habit is very marked in the youngest of nymphs, even those of one day old. As the adult stages are approached, the green tints become tinged with yellow, these again take on a darker shading and tone down to grey-greens, dull-reds, mottled-browns, and dark-greys.

Adults. Generally speaking these insects are long, slim, very narrow, and stick-like in shape. The female is much longer than the male and measures on an average from 3¼ inches to 3½ inches in length, and not more than 3/16 inch broad at the widest part of the abdomen. The head is short and truncate, fits closely to the thorax and at first sight appears to be part of same. The antennae are situated well in front of the eyes and stand upon strong pedestals which are placed widely apart on the head; they are very fine, thread-like organs, of many segments and very long, often exceeding 2 inches; the eyes are large, bulging and strongly rounded; the palpi long, prominent, and conspicuously used while feeding. Not only does the female differ from her mate in length, but her front legs are more dilated, the ridges and grooves on these being more distinctly and deeply marked; the peculiar curve at the base of the front femora which permits the legs to fit very closely to the head is more pronounced than in the male; the middle femora are not swollen as is certainly the case in the male, and the spurs carried on the femora of the second and third pairs of legs are small, insignificant points when compared with those of the male's which are very prominent, sharp and thorn-like, situated near the knee joint. In the female the head and legs are without markings, whereas the male has three

vertical dark-brown stripes on his head and three broad bands of the same colour on the middle femora. Perhaps the thorax is worthy of more than usual attention on account of its extraordinary length. The prothorax, or first division, is very short and bears the first pair of legs which come off from the centre; the second division, or mesothorax, is easily the longest segment in the body, averaging $^3/_4$ inch; while the third, or metathorax, is a little shorter than the second, in the last two cases the legs being situated at the very extremity of the joints, respectively. The final segment of the male terminates in a pair of pincer-like claspers with which he seizes the female securely when mating.

Copulating habits. Copulation occurs frequently and is often of some duration. *In coitu* the abdomen of the male is ranged at the side of the female in a slanting position, the tip being hooked upward somewhat after the manner in which a scorpion carries its tail, and brought forward to meet the genital opening of the female which is situated on the eighth segment of the abdomen: the claspers seize just above the opening and the union is made immediately. The front and middle pairs of legs are usually employed to grasp the female, while the third pair is extended outwards as a support. The female holds to her resting place chiefly by the second and third pairs of legs. Sometimes one of the front legs will act as a support, say on the side of the cage, while the other hangs out into space. The front pair, however, is often extended straight forward and placed close together appearing as only one member, or spread out widely apart and raised somewhat upwards in much the same attitude as that of the praying mantis, a near relative of the walking stick. Oviposition begins at once.

Oviposition. This occurs in late summer and autumn, from about the middle of August to October. The female walking stick has no interest whatever in her eggs after she has laid them. She scatters them indescriminately from wherever she happens to be, dropping them from the topmost branches of some oak or from a low coppice to the earth—it is all the same to her,—she has finished with them entirely and neither knows nor cares afterwards what becomes of them. On the ground the majority get covered up in the long grasses or become hidden among the dead leaves, mosses and general debris of the woods at autumn time in this way they receive protection from birds and other enemies until hatching in June.

Oviposition is an interesting performance. When ready to be deposited the egg is slowly pushed down the oviducts to the exterior and as it emerges the egg guides are forced downward to receive it. It glides on to these and is held there as if in a hand, being supported on either side by two finger-like processes. The black and shiny portion lies at the top of the guides and the whitened area with its crease and scar at the bottom. The operculum end appears last. The egg is held about 5 minutes on the guides and when dry the female stirs by walking a step or two, or vigorously jerks her abdomen sideways, sending the egg from her to the ground. From laboratory records this summer, the two females I had confined in cages laid respectively 152 and 141 eggs, at an average rate of three a day. Oviposition was carried on intermittently with copulation, eggs being laid up to within a few hours of the death of the female. Perhaps one of the strangest habits peculiar to some of the females at this time,

when oviposition is at an end, is the withering and splitting of the abdomen much the same as a bean pod will dry, curl and split open.

Females in the late fall may be found in this unfortunate spent condition with strength only left to drag themselves about awhile longer. Some specimens in our collection exemplify this most extraordinary characteristic.

Time of Hatching. Although abundant during 1918 it is worthy of note that throughout the past season, 1919, these insects were exceedingly scarce. Whether this was due to parasites, or weather conditions, or other controlling factors I am unable to say. A close watch was kept throughout the summer for any sign of their activities but I only succeeded in locating one nymph on June 14th, and two pairs of adults and one female on August 13. These last were collected for egg records and I was able to keep them in the laboratory until the beginning of October.

In his Report of Forest Insects for 1878, I find that the late Doctor Riley, of the United States Bureau of Entomology, refers to a communication received from a Mr. Snow, of Yates Co., N. Y., in which the latter states that walking sticks were unusually abundant every other year and that many of the eggs were found to remain on the ground for two consecutive winters before hatching. A further reference in this same report is made to the investigations of Messrs. Bringham and Trouvelot. These gentlemen, writing in the Proceedings of the Boston Society of Natural History, Volume XI, pages 88 to 89, observed that the eggs of the walking stick only hatch after an interval of two years.

Eggs laid in the summer of 1918 and held in storage for winter and spring in a box of sand left exposed to the atmosphere failed to hatch last summer. Those of 1919 were put into glass vials corked with loose cotton batting and left on the laboratory table in a temperature averaging about 70 degrees. On January 28th, 1920, I examined several of these and found them well advanced in their embryonic development. About 18th February, much to my astonishment, a nymph made its appearance in one of the bottles, to be followed by several others at irregular intervals. I had nothing at the time to feed the youngsters on except rock fern (*Pteris* sp.) to which they did not take happily. Later I tried several kinds of green foods, lettuce, tradescantia, geranium, etc., and dried oak leaves soaked in water, but to no avail. The nymphs all died.

Notes on Habits. The Phasmids have been popularly considered harmful and poisonous. Such is not the case. In fact the very reverse is the truth. They are quite harmless, inoffensive creatures, strict vegetarians and easily managed in confinement. One large female, I had in the house for three months and made quite a pet of her. I would often remove her from the cage and allow her to walk over a pot of ferns on the table. She would meander up and down on the green leaves, not attempting to drop to the table or trying to get away. If I put water on the leaves she would immediately take some up and blow it out from her mouth in the form of a bubble, then draw it in and blow it out again, keeping this up for some time, as it were for my amusement. Again I would place her on the table near an electric light. She would walk towards it, hesitate, look around as if uncertain what next to do, then rear herself, spreading out her long front legs to the light, as much as to say "Humph!

I wonder what that is?" and all the time waving her antennae, much the same as a cockroach will do when on the scent for food. After the frost came, killing most of the vegetation, I would gather a few dried oak leaves and soak them in water for her. These she would eat sparingly of, often preferring only to drink up what moisture there might be on the leaf surface. Finally I could get nothing more green for her in the garden and tried a sprig of white pine needles. These she refused. Her egg record dropped to one a day and this only at spasmodic intervals. She was getting weak and helpless. One night I found she had fallen to the bottom of the cage and seemed unable to move. Next morning she was dead.

Walking Sticks are remarkably strong and adhere tenaciously to clothing, netting or roughened surfaces from which it is difficult to remove them without injury, since the legs break easily. Very smooth surfaces are no hindrance to their movements due to the circular white pulvillus, or suction pad on each tarsus, and they will walk up or down the sides of a glass cage quite as easily as on the flat table. Feeding usually takes place at night, and during the day they rest quietly, for the most part at the top of the cage on the cloth covering, head and back downwards. The males spend most of their time *in coitu*, eating little or nothing in confinement. They are the first to die, the females living on for weeks afterwards to deposit their eggs.

Injury. At Aylmer any damage done by this insect so far as I have observed has been negligible. There are, however, localities in the States where the walking stick has proved a serious pest. Mr. Fernald, Economic Zoologist at Harrisburgh, Pa., 1898, reports the appearance of walking sticks near Duncanville Pa., "in countless numbers." The trees attacked were mostly chestnut, oak, and maple, the area of infestation being over one mile long and half a mile wide. Mr. Snow of Yates Co., N. Y., in a letter to Doctor Riley in 1878 relates how walking sticks "had stripped 25 acres of young timber, mostly white oak and hickory, on his reservation."

That such severe infestations as these are likely to occur in Canada I am inclined to doubt, but in the warmer sections, such as Niagara Glen, minor, local outbreaks may take place, as for example that referred to in Ont. Ent. Report, 1904. However, these creatures are very susceptible to cool weather and it is quite possible that the early frosts of the more northern latitudes play a considerable part in their control.

Control. The following control methods have been recommended by Doctor Riley: Poison the vegetation by spraying with Paris green to kill off the very young nymphs and destroy eggs by digging, or burning the grass and vegetation. These appear to be very effective measures but I have had no opportunity so far to test any of them. One female stick in a sickly condition. I secured this summer had eight or ten tachinid eggs on different parts of the body. She refused all food and died two days after being brought into the laboratory, the body becoming quite limp and withered. I kept the specimen in a vial for closer examination, but no evidence of parasites was observed so concluded that their life cycle had been interrupted by the death of the host which perhaps was brought about by some other agency than the fly itself.

SOME NEW SPECIES OF THE GENUS LONCHÆA (DIPTERA, LONCHÆIDÆ).

BY J. R. MALLOCH,
Uabana, Ill.

Lonchæa major, sp. n.

Male.—Shining black, with a slight bluish tinge. Antennæ and palpi black; arista yellowish at base. Legs pitchy black, the hind tarsi hardly paler than their tibiæ. Wings hyaline, veins brownish yellow, whitish at bases. Calyptræ white, fringes concolorous except at junction of upper and lower, where there are some long, black, setulose hairs. Halteres black.

Eyes bare; frons about twice as long as wide, parallel-sided, surface with short, moderately dense hairs; upper orbits slightly rugose above, bare; frontal lunule hairy; longest hairs on arista over twice as long as its basal diameter; third antennal segment about four times as long as its width, extending to mouth margin. Scutellum with setulose hairs on margins and between apical bristles, the disc bare; pteropleura bare; no hairs adjacent to the stigmatal bristle. Abdomen broad, with rather dense, short, setulose hairs on dorsum; fourth tergite about 1.5 as long as third. Hind femur without distinct anteroventral bristles. Auxiliary vein almost fused with first at its apex.

Length 6.5 mm.

Type.—Amazon, South America. Type in British Museum.

Lonchæa nigrocærulea, sp. n.

Male.—Blue-black, almost metallic in colour. Antennæ and palpi black; arista pale at base; upper orbits and ocellar triangle glossy. Legs black. Wings, calyptræ, and halteres as in *major*.

Frons about 1.5 as long as wide, sparsely hairy; upper orbits highly glossy smooth; third antennal segment about four times as long as wide, extending below mouth margin; arista as in *major;* palpi dilated, slightly protruded. Praescutellar acrostichals very long; scutellum as in *major;* pteropleura bare; no bristly hairs adjacent to stigmatal bristle. Abdomen with longer hairs than in *major*, especially at apex of fourth tergite; fourth tergite about twice as long as third. Venation as in *major*, but the antepenultimate section of fourth vein is only two-thirds as long as penultimate, whereas in *major* it is three-fourths as long. Hind femur with a few distinct anteroventral bristles.

Length 4 mm.

Type.—Barbados (E. F. Becher). Type in British Museum.

Lonchæa striatifrons, sp. n.

Male.—Glossy steel-blue, the abdomen paler than the thorax. Frons shining black, ocellar spot and upper orbits glossy blue; third antennal segment reddish at base below. Legs black, tarsi with the exception of the apical two or three segments reddish testaceous. Wings clear, yellow at bases. Calyptræ white, fringes concolorous. Halteres black.

Frons less than twice as long as wide at anterior margin, not distinctly

narrowed anteriorly, the surface of interfrontalia finely striate on upper half laterally; orbits narrow, distinctly separated from ocellar triangle posteriorly their surfaces microscopically diagonally striate anteriorly; hairs on frons short and sparse; third antennal segment three times as long as wide; cheek narrow, without dense hairs or strong bristles. Thorax as in *polita* Say. Basal abdominal sternite with some hairs on each side. Legs and wings as in *polita*. Fringes of calyptræ longer than usual, about six of the hairs at apex of the fold setulose and longer than the calyptræ.

Female.—Frons at least one-third of the head-width and less than 1.5 as long as wide, not so distinctly striated as in male. Ovipositor as in *polita* Say.

Length 4–4.5 mm.

Type.—Male, allotype, and one male paratype, Santa Clara, Cal. (Baker); one male, San Diego, Cal. (Harkins collection); one male, Palo Alto, Cal., August 3. Type in collection of University of California.

Lonchæa bakeri, sp. n.

Female.—Glossy black, without distinct bluish tinge, the frons greenish blue anteriorly. Face and cheeks with whitish pruinosity; frons shining upper, orbits and ocellar triangle glossy; antennæ brownish black. Legs black, tarsi yellow, apical two segments darkened. Wings clear, veins yellow. Calyptræ and their fringes white.

Frons at vertex one-third of the head-width, not narrowed anteriorly, its length about 1.5 of its width, surface microscopically striate on upper half granulose anteriorly, with sparse hairs; upper orbits almost imperceptibly striate; third antennal segment not twice as long as wide; face not carinate, cheek with 3 or 4 strong, but not very long bristles on lower margin anteriorly. A strong bristle on upper margin of mesopleura a little behind spiracle and considerably cephalad of the vertical series at anterior margin of haired area; scutellum without hairs between apical bristles. Ovipositor not broad, the apical hairs very short. Hind femora without antero-ventral bristles; antero-dorsal setulæ on hind tibiæ stronger than usual. Veins 3 and 4 very slightly convergent apically. Fringes of calyptræ normal.

Length 3 mm., exclusive of ovipositor.

Type.—Chinangega, Nicaragua (F. C. Baker).

Named in honour of the collector.

This species is closely allied to *albiceps* Malloch, having the same armature of the mesopleura, and the same type of frons but without the transverse depression, and the calyptræ white, and venation different.

Type in collection of University of California.

AN ADDITION TO BIBLIOGRAPHY ON AGRILUS (Coleop.).

Through an oversight on our part, a recent paper of Burke's was omitted from the *Agrilus* bibliography, (Can. Ent., Sept., 1920, p. 204), and is given below.

Burke, Jour. Econ. Ent., Vol. 10, No. 3, pp. 325–332, 1917. Contains notes on food plants and habits of *Agrilus angelicus* Horn, *A. niveiventris* Horn, *A. granulatus* Say, *A. anxius* Gory, *A. acutipennis* Mann., *A. politus* Say.

C. A. Frost and H. B. Weiss.

OVIPOSITION BY AN EVANIID, EVANIA APPENDIGASTER LINN.

BY VERNON R. HABER,
North Carolina State Dept. Agriculture, Raleigh, N.C.

Recently the author and his wife witnessed oviposition by an ensign fly, *Evania appendigaster* Linn, in an egg mass of an Oriental cockroach, *Blatta orientalis* Linn.

On Sunday evening, August 8, 1920, as the female Evaniid drank from a drop of water which accidentally had been spilled upon the floor of our room she was captured by inverting an ordinary glass tumbler over her, slipping a piece of paper between the mouth of the tumbler and the floor upon which it rested. As this was done the Evaniid leaped upon the inside wall of the tumbler, soon becoming rather restless, for she ran over the inside surface of the glass and over the piece of paper upon which it rested.

Fortunately we had at our disposal an egg mass of a cockroach, *Blatta orientalis* Linn. which had been deposited in the morning of the same day that we captured the Evaniid. By slightly tipping the inverted tumbler we

Fig. 23.—Oviposition of *Evania appendigaster* L.

shoved the Blattid egg mass beneath it. Much to our surprise almost immediately there in bright electric lamp light the Evaniid left the inside wall of the confining tumbler, ran over the Blattid ootheca, crawled over the surface momentarily as she actively vibrated her antenna and finally settled upon it with the long axis of her body parallel with the long axis of the egg mass as it lay upon its right side. Having satisfactorily settled herself, lying upon her right side she extended her ovipositor and crawling slightly forward she punctured the ootheca in the fifth egg cell of the left side, remaining in position for about fifteen minutes. She then left the egg mass and resting upon the inside wall of the tumbler actively cleaned the ovipositor, wings and antennae. Later, at 10.00 p.m. I turned the ootheca that it rested upon its left side. She revisited it but soon ran a short distance away and continued to clean her legs, wings and antennae. On the following day we introduced another freshly deposited egg mass of the same species of cockroach. The Evaniid visited it and running inquisitively around it several times she finally tried to turn it upon its opposite side by running across the middle of its length dragging the hind legs that they hooked the flanged edge of the ootheca. She failed to turn it completely over and left it, apparently little concerned by its presence.

X of the figure represents the ootheca of *Blatta orientalis* Linn. lying upon its right side and the Evaniid in position as she oviposits in the puncture which she has made at (a).

Y of the figure shows the ootheca still in the same position as in X, but the Evaniid has left it, showing the oviposition puncture at (a).

NOTES ON THE COLEOPTERA WITH DESCRIPTION OF NEW SPECIES.

BY C. A. FROST.
Framingham, Mass.

(Continued from page 232.)

Chrysobothris verdigripennis Frost. My type material was taken at Wales, Maine, on July 23, 1908, and fortunately included both sexes and the extremes of colour variation. Considerable study was given the series the following winter, and the characters were carefully worked out so that it was apparent that an undescribed species was at hand. After this, specimens were submitted to Mr. Blanchard who made further investigations, and to whom the entire series was sent for a description of the species. He delayed this for some months, and when he suggested turning it over to another specialist, I requested the return of the specimens and finished my investigations.

Since the description (Jour. N. Y. Ent. Soc., Vol. XVIII) I have seen but one living specimen, which was resting on the trunk of a lone hemlock in a small clearing at Monmouth, Me., July 18, 1915. I approached too cautiously, and as it took wing the net missed it by an inch. He who would capture this agile and watchful insect must be quick and sure, for it tarries not. I recall that the original series were resting on beech trunks in the hot July sunshine, and after losing several I tried making a quick leap, thrusting the net below them and smashing down on them with my hat or a bunch of ferns as they rose; This method resulted in sweeping some of the specimens into the net.

I have also seen one specimen from Connecticut, two from Le Pas, Manitoba, (J. B. Wallis), one from Vermont, and a typical male from Port Maitland, Nova Scotia, August 2, 1910. A male I retained from the two Manitoba specimens (July 3, 1917) is only 11 mm. in length and a of dark bronze colour, but otherwise typical. Mr. A. S. Nicolay writes me that he has one from Lake Superior, and another from the Catskill Mts., New York, August 14, 1889.

Agrilus lateralis Say. The capture of a pair of this species by Mr. C. W. Johnson at St. Augustine, Fla., April 21, 1919, seems to add a new section of the country to the already wide distribution of this rather uncommon insect. The female of this pair is unusually large, 9.4 mm. It has been recorded from Maine (Wales, June 23, 192) to New Mexico.

Agrilus champlaini Frost. Since the description (Can. Ent., 1912) the male holotype has been deposited in the collection of the State Agricultural Experiment Station at New Haven, Conn. The female allotype and a typical male are still in my collection. The remains of an *Agrilus* that strongly resembles this species were dug, together with a dead *Saperda obliqua*, from a gall on *Alnus incana* at Framingham, Mass. The gall appeared to have been mainly the work of the *Saperda*. *Champlaini* was described from specimens reared from galls on the twigs of *Ostrya virginica*.

Agrilus criddlei, n. sp. Form of *anxius*, less elongate, olivaceous bronze, with bluish reflections, slightly shining; antennæ reaching beyond the middle of the thorax, serrate from the fourth joint, greenish bronze; front slightly concave, greenish, occiput very slightly impressed, median line reaching middle of front, surface with coarse, rough punctures irregularly confluent.

Prothorax about one-fourth wider than long, base equal to apex in width, sides feebly arcuate, margins slightly sinuous, hind angles with an evident but not sharply-defined arcuate carina, disk convex with a shallow basal depression in front of scutellum, and two vague foveæ in front of middle on each side, surface confusedly strigate, intervals punctate. Scutellum smooth, shining aeneous, not carinate.

Elytra very little wider than the thorax, slightly sinuate behind the humeri, a little wider at middle than at base, apices rounded serrulate, not acute; disk sub-convex with vague costæ, suture elevated behind the middle, basal depressions moderate, surface imbricate-granulate.

Body beneath more shining and more bronzed than above, pubescent; prosternal lobe emarginate, intercoxal process moderately broad, slightly concave, tip acute, surface coarsely punctate becoming asperate toward the tip, a smooth space at middle of lobe, propleuræ less coarsely punctured; metasternum with a central smooth, narrow groove, surface coarsely asperate at middle, becoming densely irregularly strigate at sides, on the coxal plates and metaepisterna; first abdominal segment more finely strigate becoming more sparse at middle, rest of ventral segments sparsely punctulate, denser at sides; first ventral segment with a broad, shallow groove sparsely strigate above, smooth with a few asperities near second segment, on which it becomes smooth and vanishes near the posterior edge, last segment eroded truncate, vertical portion truncate and smooth; pygidium sparsely coarsely punctate with a projecting carina. Front and middle tibiæ feebly mucronate, hind tibiæ simple; claws deeply cleft on all the feet alike. Length 7.5 mm., width 2 mm.

The type is a male from Aweme, Manitoba, collected by Mr. Norman Criddle, to whom the species is dedicated. A male paratype from the same locality and date (June 25, 1903) is very similar except that the front is decidedly concave. There are at hand a male and a female from Toronto, Ontario, and a male from Rigaud, Quebec, all of which seem to belong to this species, but as there is but one tarsal claw, and that a middle one, among them, they will be merely noted. Dr. Horn mentions a single specimen of this species, without locality, under his remarks about *anxius* (Species of Agrilus of Boreal America. Trans. Am. Ent. Soc., Vol. XVIII).

The most evident character that separates this from *anxius* is the cleft claws of the hind tarsi, but there are many, more obscure, differences that appear to be constant when the insects are carefully studied. The head is broader between the eyes, front more concave, and more coarsely punctured, inner margin of eyes straighter, emargination of clypeus more shallow and abrupt, prothoracic margin less sinuate, sides less arcuate, base wider nearly equaling the elytra, emargination of the prosternal lobe less deep, beneath more coarsely and densely sculptured in general, cleft of claws more wide and deep.

Agrilus auricomus Frost. This species has so far turned out to be extremely local and occurs only for a very limited period, possibly less than a week. Specimens of both sexes were taken on a single red oak tree, June 14, 1913, in the same locality where the types were taken in 1909. On June 9, 1915, they were found on a red oak tree 200 feet north of 1913 locality. It has been found only on one tree in the same year, although careful search for it has been made on

all the surrounding oaks; no captures have been made after three days in succession, and in 1914, 1916, 1917, 1918 and 1919 none were found in the type locality. One specimen has been seen from Hubbardston, and a specimen was taken from tanglefoot on a white oak in Sherborn, Mass., in July.

Agrilus crataegi Frost. Since the description from Pennsylvania material the species has turned up in Edgebrook and Riverside, Ill. Specimens were taken by Mr. Emil Liljeblad, June 12 to 26, 1913, and June 20 and 27, 1914, and others by Mr. Carl Selinger on June 11, 1915. A large number of both sexes have been examined from this locality, and but one slight colour variant noted; in this the cupreous reflections of the posterior fourth of elytra are wanting. Two specimens have been seen from Virginia, taken in June by Mr. Nathan Banks.

Telephorus neglectus Fall. This species was first discovered in the pupal state while digging up an abandoned ant hill, April 30, 1910. They were of a pinkish colour and soon changed to nearly black. Other pupæ were found April 27, 1913, and changed to adults on May 4.

In comparing these adults with supposed *carolinus* the difference in the form of the claws was noticed and specimens of both forms were sent to Dr. W. Horn, of Berlin, Germany. He submitted them to M. Pic, who pronounced them both *carolinus*, but Dr. Horn agreed with me that the specimens with the claws basally toothed (*neglectus*) must be placed near *dentiger*. The type of *dentiger* was then examined and found to be entirely different. There might seem to be some question which of the two species was before Fabricius, but from the known habitat of *neglectus* it is probable that the more widely-distributed and generally accepted form is the true *carolinus*.

Besides the ungual characters, the elytra are more coarsely granulate-punctate and slightly more shining, the second and third antennal joints are more nearly equal in the female of *neglectus*. There is also a small angle of the yellow (sometimes pinkish) border entrant into the base of the dark thoracic disk at the middle; while this is an apparently trivial thing, it is constant in my large series, and the species were separated by this character before using a lens to examine the claws.

Laricobius erichsoni Rosen. Several specimens of this rarely-taken beetle were found on willow catkins at Sherborn, Mass., April 19, 1913, and May 8, 1909. In 1919, on May 18, one was swept from the flowering shrubs of *Rhodora canadensis* at Framingham.

Geotrupes horni Blanchard. The recorded range of this species is considerably extended toward the northeast by the capture of two specimens at Monmouth, Me., while digging under fungi on September 4 and 9, 1917.

Disonycha funerea Rand. A specimen has been taken at Wellesley, Mass., by Mr. A. P. Morse, May 9, 1892, and I have seen another one in the collection of Mr. E. J. Smith, of Sherborn. It was originally described from Florida; there are two specimens in the Harris collection from Georgia.

Barynotus schoeneri Zetterst. In the "Rhynchophora or Weevils of North Eastern America", by Blatchley and Leng, this species is recorded as having been taken at Wales, Me., and Framingham, Mass. This is an error due to my carelessness in not verifying the characters of a species of *Panscopus*

(probably *erinaceus*) after getting the name from another collection. My single *Panscopus erinaceus* was so discoloured that I did not until recently recognize their resemblance.

Allandrus brevicornis, n. sp. Form shorter and more robust than *bifasciatus*, black to piceous black with a brassy tint in some specimens. Head and beak densely, closely punctured with sparse white pubescence, beak dilated at tip, with a very fine but distinct carina extending from in front of the eyes nearly to the front margin, eyes prominent; antennæ dark piceous, reaching the hind angles of the prothorax in the female and passing them by the length of the club in the male, first joint short; second nearly equal to third but stouter; third longer than the fourth which is equal to fifth; sixth, seventh and eighth nearly equal, shorter and broader; club flattened, first joint as long as next two. Prothorax closely punctured, gradually narrowed in front and abruptly behind the remote transverse ridge which is nearly straight in the transverse portion and flexed forward at the sides where it is distinct nearly to the middle of the prothorax. The grayish-white pubescence is irregularly distributed and more evident in front of the scutellum, at basal angles and front margin. Elytra with lightly impressed, deeply punctate striæ; the punctures are larger and more widely separated on the disk near the base, becoming finer and less distinct toward the apices, intervals densely, finely granulate-punctate, the whitish pubescence which is very sparse is condensed on the scutellum, in a median fascia, which extends along the suture to base but does not reach the margins at the sides, in a less-defined fascia at the declivity, and at the apex. Beneath more densely pubescent with grayish-white hairs, which are more evident on the prosternum, densely punctate, more shallowly on the abdomen. Length 2 to 3.8 mm. Width 0.8 to 2.6 mm.

This species differs from *bifasciatus* in its shorter form, black colour, darker antennæ and legs, shorter and more widely dilated beak, more prominent eyes, narrower and more densely-punctured intervals of the elytra, larger, deeper and more crowded punctures of the striæ, and more especially by the very fine carina of the beak (which is so elevated in the male of *bifasciatus* as to nearly equal in height one-half of the width of the beak), and the length of the male antennæ (which in *bifasciatus* is equal to the entire body exclusive of the beak). The sparse pubescence gives it the appearance of a black insect, while the dense pubescence of *bifasciatus* causes it to appear as a grayish one. The first three abdominal segments of the male are slightly flattened.

This species has been taken frequently by beating dead willows at Framingham, Mass., June 19 to July 27. One male from Monmouth, Me., differs in the less distinct carina of beak which seems to be situated at the bottom of a shallow concavity. I have taken in all at least a dozen specimens of this, but none of the real *bifasciatus*, while in the Blanchard collection there are 10 specimens of the latter and none of *brevicornis*. I have at hand two female specimens belonging to Mr. F. S. Carr, of Edmonton, Alta., which were taken there on July 30, 1916, and June 11, 1918. One of these is much larger (3.8 mm.) than any of mine, and the whitish pubescence is more dense, contrasting strongly with the black denuded places. The carina of the beak in this specimen is nearly obsolete.

The disposition of the types is as follows: Two in the collection of Mr. F. S. Carr, Edmonton, Alta., one each in the Museum of Comparative Zoology at Cambridge, the collection of the Boston Society of Natural History, the National Museum collection at Washington, the collection of H. C. Fall, and seven in my own collection.

A SYNOPTIC REVISION OF THE ANTHOMYIID GENUS HYDROPHORIA ROBINEAU-DESVOIDY (DIPTERA).

BY J. R. MALLOCH,
Urbana, Ill.

The species of this genus with the exception of *subpellucens* Malloch are entirely black, with the tibiæ yellowish in a few cases. The thorax is usually distinctly trivittate, and the abdomen has a black dorsocentral vitta. With the single exception of *nigerrima* Malloch the American species known to me have the halteres with yellow knobs, and all have the arista distinctly hairy.

There are, I consider, two genera included under this generic name, separable as indicated in the first two captions of my key, but it is impossible for me to decide with the data available to me what the correct generic names are. Acroptena Pokorny is undoubtedly applicable to the group with hairy hypopleura, this character being used in this key for the first time, but whether Hydrophoria is synonymous or not I am unable to say as I do not have the type species before me. My object at this time is to place before students of the family data for the identification of their material in the composite group, such being of more importance than the separation of the larger segregates.

It is not at all improbable that some of the species recently described by me from America will eventually prove to be the same as European species previously described, but the species are so very similar that only a comparison of European and American examples will suffice to decide their specific identities. Comparison of European examples of *ruralis* Meigen and *subpellucens* Malloch proves that they are very closely allied if not identical, but there are some characters which do not agree entirely, and for the present I have decided to consider them as distinct.

The larvæ, so far as I know, are aquatic, and the species are mostly northern in their distribution, commonest in the northwest.

Key to Species.

MALES.

1₂ Hypopleura with some long hairs on upper margin in front of spiracle .. 2.
Hypopleura bare ..... 8.

2. Halteres black; deep black species, with thorax and abdomen almost devoid of gray pruinescence; eyes separated by more than width across posterior ocelli, the orbits each with a series of long hairs along the inner margin ..... *nigerrima* Malloch
Halteres with yellow or pale knobs; thorax and abdomen with gray pruinescence; eyes usually separated by less than width across posterior ocelli ..... 3.

3. Basal segment of hypopygium with very many stout bristles which are

downwardly directed and slightly curved; the segment before it glossy, with 3 long bristly hairs on each side of disc.....*arctica* Malloch.

Basal segment of hypopygium either with short hairs or bristles on sides or with slender bristly hairs, or the segment in front of it is highly glossy and bare, or pruinose and sparsely hairy.....4.

4. Segment in front of basal hypopygial glossy, bare; hind tibia with 4 posterodorsal bristles.....*polita* Malloch.

Segment in front of basal hypopygial more or less pruinescent and with numerous bristly hairs.....5.

5. Upper calyptra dark-haired at lateral angle; bristles on abdominal tergites most dense and stronger on the portions incurved ventrad.....*katmaiensis* Malloch.

Calyptræ entirely pale-haired; bristles on tergites strongest at apices on dorsum.....6.

6. Mid femur with 3 or 4 short, strong bristles on basal half of anteroventral surface; hind tibia with 3 posterodorsal bristles.....*occidentalis* Malloch.

Mid femur without bristles on basal half of anteroventral surface; hind tibia with 2 posterodorsal bristles.....7.

7. Eyes separated by more than width across posterior ocelli; mid tibia with a small, anteroventral bristle; processes of fifth abdominal sternite moderately stout, with very minute hairs on their apical halves, and a sparse fringe of hairs on their inner margins on basal half.....*proxima* Malloch.

Eyes separated by less than width across posterior ocelli; mid tibia without an anteroventral bristle; processes of fifth abdominal sternite slender, with long hairs to apices, their inner margins with a fringe of closely-placed, rather long hairs on basal half.....*divisa* Meigen.

8. Fourth tergite (third visible) without a dense tuft of fuscous bristly hairs, which are backwardly directed, at each posterior lateral angle.....9.

Fourth tergite with a tuft of fuscous bristles or hairs at each posterior lateral angle.....13.

9. Abdomen with sides of second and third tergites largely yellowish testaceous; legs brownish, not deep black; arista with its longest hairs about as long as width of third antennal segment.....*subpellucens* Malloch.

Abdomen and legs entirely black; longest hairs on arista not as long as width of third antennal segment.....10.

10. Hind tibia with a few bristly hairs on posterior surface basad of middle.....10 a.

Hind tibia without bristly hairs on posterior surface; hypopygium with strongest bristles at or near its base.....11.

10a. Narrowest part of frons not wider than distance between posterior ocelli; process of fifth sternite elongate, subcylindrical, their inner margins with a few fine hairs, their outer margins with some long bristles.....*galeata* Malloch.

Narrowest part of frons as wide as distance across posterior ocelli; process of fifth sternite short, broad, glossy, their inner margins fringed with long, fine hairs, their outer margins bare.....*seticauda* Malloch.

11. Parafacial in profile at base of antennæ distinctly broader than third antennal segment; eyes separated by at least as great a distance as width across posterior ocelli; processes of fifth sternite broad, fringed along their inner margins with fine hairs, the disc with a few bristly hairs.....12.

Parafacial in profile at no point as broad as third antennal segment; eyes separated by about width of anterior ocellus; processes of fifth sternite narrow, fringed along their inner margins with hairs which apically become longer and are incurved, the disc with long, bristly hairs which are similar to those on inner margins.....*uniformis* Malloch.

12. Thorax with at least one pair of well-developed presutural acrostichals; mesopleura with 3 or 4 bristles near upper anterior angle.....*coloradensis* Malloch.

Thorax without distinguishable presutural acrostichals, with fine hairs only; mesopleura with a few bristly hairs near anterior upper angle....12a.

12a. Longest hairs on arista much longer than its basal diameter; hind tibia with three posterodorsal bristles.....*flavohalterata* Malloch.

Longest hairs on arista not as long as its basal diameter; hind tibia with three long and one or two short posterodorsal bristles....*congrua* Malloch.

13. Fourth (visible) tergite at middle much shorter than third; hind femur without bristles on posteroventral surface except one at apex and a small one near base; arista plumose basally.....*elongata* Malloch.

Fourth tergite at least as long as third; hind femur with some bristles on basal half of posteroventral surface.....14.

14. Third tergite with very short bristles in lateral tuft, the tuft not conspicuous, the tergite not much narrowed laterally; longest hairs on arista longer than its basal diameter.....*borealis* Malloch.

Third tergite with a conspicuous tuft of long bristles at lateral margin, the tergite much narrowed laterally.....15.

15. Longest hairs on arista about as long as width of third antennal segment; tergal tuft very dense, the bristles rather uniform in length, not extending beyond apex of fourth tergite.....*ambigua* Meigen.

Longest hairs on arista not longer than its basal diameter; tergal tuft not very dense, the bristles of unequal lengths, some of them extending to apex of abdomen ..... *alaskensis*, sp. n.

FEMALES.

1. Hypopleura with a few long hairs on upper margin in front of spiracle, rarely these hairs absent or almost so, but all species have the orbits with a number of setulose hairs, which are sometimes very long, laterad of the supraorbital bristles; apical genital segment without short-curved spines.....2

Hypopleura bare; no setulose hairs laterad of the supraorbitals; apical genital segment with a few short-curved spines or bristles besides the usual hairs.....5.

2. Halteres black; mid femur with a few strong bristles and numerous long setulose hairs on anteroventral surface; parafacial in profile distinctly broader than third antennal segment.....*nigerrima* Malloch.

Halteres with yellow knobs.....3

3. At least the hind tibia partly or entirely yellowish testaceous; mid tibia without an anteroventral bristle; hind tibia with 2 posterodorsal bristles.....*divisa* Meigen.
   All tibiæ black; mid tibia with an anteroventral bristle; hind tibia with 3 or more posteroventral bristles.....4.
   All tibiæ black or fuscous; mid tibia with an anteroventral bristle; hind tibia with 2 posterodorsal bristles.....*proxima* Malloch.
4. Dorsum of thorax and abdomen slightly blue-gray pruinescent; longest hairs on arista much shorter than width of third antennal segment; mid tibia with one anterodorsal bristle.....*arctica* Malloch.
   Dorsum of thorax and abdomen densely pale gray pruinescent; longest hairs on arista at least as long as width of third antennal segment mid tibia with 2 anterodorsal bristles.....*polita* Malloch.
5. Legs brown or dull yellowish, not deep black; basal dorsal abdominal segment largely yellowish testaceous on each side; hind tibia with 2 posterodorsal bristles; longest hairs on arista distinctly longer than width of third antennal segment; small species, not over 5 mm. in length.....*subpellucens* Malloch.
   Legs deep black; abdomen not yellowish at base; hind tibia with 3 or more bristles on posterodorsal surface, the basal one sometimes very weak....6.
6. Hind femur with several long hair-like bristles at base on posteroventral surface.....7.
   Hind femur with one bristle at base on posteroventral surface.....11.
7. Costal thorns both small, sometimes barely distinguishable from the adjacent setulæ, never as long as the inner cross-vein; parafacial in profile conspicuously narrowed below, not nearly as wide as third antennal segment at lower margin of eye.....*uniformis* Malloch.
   At least one of the costal thorns long and conspicuous, sometimes as long as the inner cross-vein; parafacial in profile but little narrowed below, as wide as third antennal segment for nearly its entire length.....8.
8. Hairs on arista not longer than its basal diameter; mid tibia with 2 anteroventral bristles; spines on apical genital segment short and strong, 12–14 in number; hind tibia with one or more posterior setulæ.....*alaskensis*, sp. n.
   Hairs on arista much longer than its basal diameter; mid tibia with 1 anteroventral bristle.....9.
9. Thorax with two or three pairs of weak acrostichals and some hairs in front of suture; genital segment similar to that of *alaskensis*.....*seticauda* Malloch.
   Thorax with central area in front of suture with 4 or 6 series of weak hairs.....10.
10. Apical genital segment with about a dozen short, strong spines; hind tibia with 4 posterodorsal bristles.....*borealis* Malloch.
    Apical genital segment with 2 fine, short bristles and some hairs; hind tibia with two or three posterodorsal bristles *flavohalterata* Malloch.
11. Mid tibia with one or more short bristles immediately basad of the anterodorsal one; thorax with two or three pairs of presutural acrostichals.....*elongata* Malloch.

Mid tibia without short bristle above the anterodorsal one; thorax usually without presutural acrostichals.....*ambigua* Meigen.

Hydrophoria alaskensis, sp. n.

Male and Female.—Thorax indistinctly trivittate. Abdomen with distinct dorsocentral vitta. Legs black. Wings slightly brownish in basal cells. Calyptræ white. Halteres yellow.

Male.—Narrowest part of frons about one-tenth of the head-width; parafacial at base of antennæ at least as wide as third antennal segment; longest hairs on arista about twice the basal diameter of arista; cheek about one-fourth as high as eye. Presutural acrostichals weak. Abdomen with very long bristles on sides of third tergite, some of which extend to or beyond apex of abdomen. Fore tibia with one anterodorsal and one posterior bristle at middle; mid tibia with two anteroventral, one or two anterodorsal, and four posterior bristles; hind tibia with four or five anteroventral, an uneven series on anterodorsal, and three posterodorsal bristles, and a few weak posterior setulæ.

Female.—Eyes separated by about one-third of the head-width; interfrontalia with a pair of cruciate bristles.

Length 5 mm.

Type.—St. George Island, Behring Straits, June 8, 1914. Allotype and 72 paratypes, same locality, June 10–25, 1914, (G. D. Hanna). Paratypes, 6 specimens, St. Paul Island, Alaska, August, 1910, and three specimens, Pribilof Islands, Alaska, August, 1910, (H. Heath).

The specimens from St. George Island are in the collection of the United States Bureau of Biological Survey, those from the other localities are in the collection of the University of California.

The description of this species was written about six years ago from a report of the insects of the Pribilof Islands which has not yet appeared in print, and it is now included to make as complete as possible the synopsis in this paper.

THE PEA MOTH A NEW SPECIES.

By Carl Heinrich,
Washington, D. C.

Laspeyresia novimundi, n. sp.

Palpi, face, head and base of patagiae dirty, whitish ochreous. Thorax dark lead gray. Fore wings dark greyish fuscous with a leaden gloss and in apical third a faint red brown suffusion; on costa from middle to apex six short white geminate dashes inwardly margined by black; from the first of these extends a lead bar joining and forming with the inner vertical bar of ocellus a narrow glossy and fairly distinct, angulate fascia; from the third geminate dash a similar and parallel leaden streak runs toward but does not quite meet the outer vertical bar of the ocellus; between the two a thin irregular line of black scales; ocellus with four short, narrow, longitudinal lines, bordered on inner and outer sides by a vertical bar of semi-lustrous lead coloured scales; cilia concolorous with wing. Hind wing dark brown, somewhat paler toward base; cilia pale brown at their base shading to white beyond. Underside of fore and hind wings a

uniform light semi-lustrous brown; costal dashes of fore wing rather faint,

Fig. 24.—*Laspeyresia novimundi*, male genitalia.

Fig. 25.—*Laspeyresia nigricana*, harpes.

legs greyish ochreous; hind tibiae and tarsi not banded. Male genitalia of type figured. Alar expanse 12-13 mm.

Habitat. Sturgeon Bay, Wisconsin.

Foodplant. Garden and Field Peas. Eight moths reared by C. L. Fluke Jr. of the Wisconsin Agricultural Experimentation Station from larvae feeding in the pods. Moths issued in July.

Type. Cat. No. 23514, U. S. N. M.

This is the species that was identified by Prof. Fernald as the European Pea Moth *Laspeyresia nigricana* Stephens and has so figured in our literature. It was first reported from Canada, destruction to peas in Ontario, Quebec and Maritime Provinces (Fletcher: Experimental Farms Report for 1897, pp. 194-195). Under the name *nigricana* Stephens it appears in several bulletins (Chittenden: U. S. D. A. Bull. 33. 1902. pp. 96-98; U. S. D. A. Bull. 66. Pt. VII. 1909. p. 95). Kearfott records it in the List of Insects of New Jersey and had several specimens so named in his collection. In a recent bulletin by Mr. C. L. Fluke ("The Pea Moth, How to Control It," Bull. 310. Agri. Exp. State U. of Wis. April, 1920) the life history of the insect here described is given. In that publication also appears a note by the author questioning the correctness of the earlier identifications. I am now convinced that our pea moth is not *nigricana* or any of the other European *Laspeyresia*. The genitalic differences are quite distinct as the figures of the harpes show. If *novimundi* is not a native species that has gone over to the pea from some wild legume it has probably been introduced from the orient. At any rate the name *nigricana* does not apply and should be dropped from our lists.

APPOINTMENT OF THE DOMINION ENTOMOLOGIST.

The news of Mr. Arthur Gibson's appointment as Dominion Entomologist, which took place early in October, will undoubtedly be received with feelings of pleasure and satisfaction in entomological circles throughout Canada. Mr. Gibson's appointment is the natural outcome of his long and faithful service as senior officer of the Entomological Branch since its inception in 1914. He received his early training under the late Dr. James Fletcher, joining the latter officer's staff in 1899, and has long been recognized, both in the United States

and Canada, as an economic entomologist of wide knowledge and experience. His kindly and genial personality and his unfailing courtesy and fair-mindedness have made him justly popular among his colleagues.

Mr. Gibson is a Fellow of the Entomological Society of London, (Eng.); Fellow of the Entomological Society of America; Fellow of the American Association for the Advancement of Science; President of the Entomological Society of Ontario; Associate Member of the American Association of Economic Entomologists; Editor of the Canadian Field-Naturalist; Member of the Canadian Society of Technical Agriculturists, etc.

We extend to Mr. Gibson our hearty congratulations on his well-deserved promotion, and wish him every success in the new responsibilities that he has undertaken.

NOTES ON SOME COLEOPTERA TAKEN IN THE VICINITY OF DUNEDIN, FLORIDA, IN THE SPRING OF 1920, WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY,
Indianapolis, Indiana.

The work on my "Orthoptera of Northeastern America" delayed my trip to Florida in the autumn of 1919, and I did not reach Dunedin until Christmas day. After my arrival a severe illness prevented any collecting for six weeks or more, and led also to the abandonment of a contemplated trip to Marco and other points along the extreme southwestern coast of the State. The first collecting was done on February 14, and from then on until April 28, I was in the field almost every day. I had hoped that by staying two or three weeks later than usual I would find the full spring fauna emerging, and thus make amends in part for the time lost during the winter, but the season, as gauged by the blossoming of plants, was a fortnight or more late, so that in the main the species taken or observed were those of previous years prior to April 10. However, from time to time I ran across a species new or rare to the State, and these, with three or four believed to be hitherto unknown, are treated on the following pages.

Bembidium picipes Kirby. A single specimen was captured Feb. 23 on a strip of bare muck along the margin of a pond near Dunedin. The first record for Florida. It was described from British America, is frequent in Indiana and ranges, according to Hayward,[2] from New England and Lake Superior, to Missouri, Kansas and Texas.

Lebia rhodopus Schwarz. A half dozen specimens have been taken about Dunedin, where it occurs from January to April on low ground vegetation; one is also at hand from Ft. Myers, Fla. The only other Florida record is that of the type from Tampa. Horn[3] made it an absolute synonym of *L. viridis* Say and not a variety as stated by Leng.[4] A careful study of the Florida specimens, as well as of a score or more taken in Indiana, substantiates my

1. See Can. Ent., April, 1917, 137.
2. Trans. Amer. Ent. Soc., XXIV, 1897, 83.
3. Trans. Amer. Ent. Soc., X, 1882, 130.
4. Bull. Amer. Mus. Nat. Hist., XXXIV, 1915, 585.

opinion[5] that *rhodopus* is a distinct species, the differences pointed out by Schwarz[6] holding good without variation throughout the series.

Lebia collaris. Dej. A single specimen was beaten from a bunch of Spanish moss in high, dry upland oak woods on April 20. It is 5.2 mm. in length, and agrees in every particular with Dejean's original description in which the length is given as 2½ lines, and breadth as 1¼ lines. The eyes are very prominent, as stated by him, the side margins of the thorax very broad, recurved and of nearly equal width throughout, while the outer joints of the antennæ are very dark brown. Attention is called to these points simply for comparison with examples of the following species which I had had in my collection for several years under the name of *collaris*, their determination having been made from Horn's "Revision of the Species of Lebia"[7] without access to Dejean's descriptions.

Lebia nigripennis Dej. Horn in his "Revision" makes this a synonym of *L. collaris*. From the text I judge that he did this without seeing Dejean's type of either species, as he says: Both Dejean's and Chaudoir's descriptions "do not seem to indicate any difference between *nigripennis* and *collaris* except in size and the colour of the head and thorax. These characters are ordinarily good, but in the present instance the colour of the head and thorax is seen to vary in our series." He then gives the length of *collaris* (including *nigripennis*) as 5 mm., whereas Dejean gives the dimensions of *nigripennis* as length 1¾ lines, breadth ¾ line, or 3.5 and 1.2 mm.

In the four specimens at hand, three from Dunedin and one from Sanford, Fla., the size is exactly as given by Dejean for *nigripennis;* the eyes are distinctly less prominent than in the *collaris* specimen above mentioned; the side margins of thorax are less wide and very evidently narrower toward the front angles; and the outer joints of antennæ are pale reddish-brown in all. Leaving aside the colour of the head, which is variable, these characters are, in my opinion, sufficient, when taken in connection with the much smaller size, to restore the name of *nigripennis*, as I believe that these small specimens represent the species which Dejean had before him in naming that form. In no one species of *Lebia* does the size vary as much as between these two forms, and Dr. Horn apparently ignored this difference in size when he combined the two and placed the length at 5 mm. The *L. collaris*, of Horn, is said by Leng to occur in the Middle and Southern States, and has been recorded from several stations in Florida.

Lebia fuscata Dej. This species is sometimes attracted by light, two specimens having been taken at porch light on March 15.

Aphelogenia vittata Fab. One example, April 19. This seems to be a rare beetle not only in Indiana but also in Florida. It is not mentioned by Schwarz, and is recorded only from Jacksonville and Lakeland by Leng.[8] All of my specimens from both States were taken by sweeping vegetation in low, damp localities.

5. Col. Ind., 1910, 145.
6. Proc. Amer. Phil. Soc., XVII, 1878, 354.
7. Trans. Amer. Ent. Soc., IV, 1872, 136.
8. Bull. Amer. Mus. Nat. Hist. XXXIV, 1915, 586.

Selenophorus ovalis Dej. My first specimen of this Carabid was found running across the sidewalk near the Club House Annex on March 16. Two others were taken at the same place on March 28. It is usually regarded as rare, is known only from Georgia and Florida, and resembles the more common *S. fossulatus* Dej., but is smaller and with the rows of dorsal punctures much less prominent.

Canthydrus addendus, sp. nov.

Elongate-oval, glabrous, shining. Head and thorax reddish-brown; the latter with front margin clouded with fuscous; elytra dark chocolate brown; antennæ, legs and under surface pale reddish-yellow. Head finely alutaceous, impunctate, much broader and more convex than in *C. gibbulus* (Aubé), the interocular space nearly twice as wide as there; clypeus much more broadly rounded; eyes larger, less convex, more coarsely facetted. Thorax with a few very fine punctures on the sides and along the front margin. Elytra oval, very convex at middle, the apical third strongly tapering; surface distinctly alutaceous, more coarsely and much more sparsely punctate than in *gibbulus*. Prosternal process behind the front coxæ narrow, spatulate, both it and median plates of meso- and metasterna very finely and sparsely punctate; hind margin of median metasternal plate subtruncate, its outer apical angles produced. Last ventral segment of both sexes compressed and subcarinate at middle. Length 3–3.2 mm.

Described from 20 specimens taken April 1 from a mass of water weeds in a shallow pond one mile northeast of Dunedin. Allied to *gibbulus* but distinctly larger and more convex. Besides the differences pointed out the median sternal plates of *gibbulus* are very coarsely and densely punctate, and the hind margin of the metasternal one is widely and deeply marginate. Cotypes of *addendus* are in the American Museum of Natural History and the collection of H. C. Fall.

Hydrochus minimus Blatch.[9] A second specimen of this minute and very distinct species was taken March 24 from a submerged board in the same pond as the preceding.

Coccinella 9-notata Hbst. Although this well-known species or its varieties are said to range over the entire United States, I can find no previous record of its occurrence in Florida. In a collection of beetles, mostly taken at porch light in July and sent to me from Dunedin, I found a single specimen.

Aulonium parallelopipedum Say. One specimen March 15 from beneath bark of dead water oak. Not before recorded from Florida but mentioned in the Schwarz MS. list [10] from Tallahassee and Crescent City.

Botrodus estriatus Casey. One specimen, Feb. 11. Beaten from dead limb of red bay at Skinner's hammock. Described from Texas.[11] No published record from Florida, but Schwarz (Ms.) has taken it at Crescent City.

Conotelus punctatus Schæffer. This Nitidulid was described[12] from Lake Worth, Fla. I have taken it at Little River, Utopia and Dunedin by sweeping vegetation in low grounds. The elytra are brown with fine but distinct elongate punctures in evident rows.

9. Described in Bull. Amer. Mus. Nat. Hist., XLI, 1919, p. 317, from a unique.
10. See footnote, p. 419, Can. Ent., Dec., 1918.
11. Ann. N. Y. Acad. Sci., V, 1890, 320.
12. Journ. N. Y. Ent. Soc., XIX, 1911, 116.

Tenebroides floridanus Schæffer. A single specimen of this recently described[13] Ostomid is in my collection from Moore Haven, where it was taken March 2 from beneath the bark of a dead custard apple shrub. Schaeffer's type in the U. S. Nat. Museum was from Key West.

Limnichus nitidulus Lec. Four specimens have been taken about Dunedin where it occurs beneath bark of dead bay trees and on foliage of low plants. Described from Georgia. Recorded by Schwarz as very rare at Enterprise, Florida.

Agriotes insanus Cand. One specimen, March 20, beaten from oak. No. species of *Agriotes* has hitherto been reported from Florida. The range of *A. insanus* is given by Leconte[14] as, "Massachusetts to Illinois, Kansas and Texas." It is frequent in Indiana where it occurs on the greater ragweed, *Ambrosia trifida* L.

Agriotes oblongicollis Melsh. One specimen was taken March 21 by beating the foliage of the wax myrtle, *Myrica cerifera* L. Leconte[15] gives its range as "Georgia to Canada and Illinois." Although Leconte and Horn in characterizing the genus *Agriotes*[16] state that the front is "not margined behind the labrum," it is distinctly so margined in *A. oblongicollis*, as mentioned by Melsheimer in his original description[17].

Drapetes geminatus Say. Hitherto known from Florida only from Enterprise, where Schwarz found it "very rare." A single specimen was taken April 14 by sweeping ferns in Skinner's hammock.

Agrilus concinnus Horn. This large and handsome Agrilid was described[18] from "Georgia and Florida," without definite locality. A single example was swept from low huckleberry bushes on April 11.

Tytthonyx flavicollis, sp. nov.

Elongate-oblong, depressed. Elytra and legs black, strongly shining, finely pubescent; head, except front of occiput, thorax, scutellum, prosternum and side pieces of meso- and metasterna bright reddish-yellow, antennæ and under surface (except as noted) piceous black. Antennæ broad, very strongly serrate, second joint half the length of third, which is slightly shorter than the fourth. Thorax transversely elliptical, larger than in *erythrocephalus*, its margins thickened and angles all rounded; disc almost smooth and with a deep, entire median furrow. Elytra at base not wider than thorax, reaching second abdominal segment, their tips separately rounded; the disk of each with three distinct but feeble costæ, the intervals strongly transversely rugose. Last ventral with a small subacute median notch. Length 4.5 mm.

One male swept April 18 from the foliage of a low huckleberry. Differs from both *T. erythrocephalus* Fabr. and *ruficollis* Schæff. in colour, in sculpture of elytra and in the form of emargination of the last ventral.

Telephorus bilineatus Say. One specimen from beneath a chunk, March 31. I was surprised to find that this common northern Lampyrid was

13. Journ. N. Y. Ent. Soc., XXVI, 1918, 199.
14. Trans. Amer. Ent. Soc., XII, 1884, 15.
15. Loc. cited, p. 16.
16. Class. Col. N. Amer., 1883, 186.
17. Proc. Acad. Nat. Sci. Phil., II, 1845, 218.
18. Trans. Amer. Ent. Soc., XVIII, 1891, 310.

not heretofore recorded from Florida. Leconte gives its range[19] as "Atlantic region to Kansas."

Odontæus filicornis Say. A male of this uncommon Scarabid was taken at porch light on March 15. Horn gives its range[20] as "Middle and Central States," but Schwarz records one specimen from Enterprise and, in his Mss. notes, another from Tampa.

Ecyrus exiguus Lec. One specimen beaten from oak, March 22. The first record for Florida, its range being given by Leng and Hamilton[21] as Ohio, Georgia and Kansas.

Mecas femoralis Hald. One specimen taken by sweeping, April 20. Schwarz lists it as rare at Fort Capron and Crescent City.

Tetraopes tetraophthalmus Forst. Two specimens taken on milkweed July 15 and sent to me. This is another common northern species of wide range which has not before been recorded from Florida, though known from South Carolina, Louisiana and Mexico.

Cryptocephalus aulicus Hald. One specimen taken by sweeping vegetation along a sandy roadway. A rare species, resembling *Griburius larvatus* Newm. in colour and markings. Described from Georgia and known only from that State and Florida. Recorded by Castle and Laurent from Enterprise and noted in the Schwarz Mss. from St. Augustine.

Graphops varians Lec. Two specimens beaten from oak, March 19 and April 10. The first record from Florida. Leconte gives its range[22] as Illinois, Texas and Kansas.

Phyllotreta liebecki Schæffer. This is the species recorded by me[23] under the name *Phyllotreta robusta* Lec. as common at Sanford along the borders of cypress swamps. Schaeffer's types were from Enterprise, and he states[24] that it is closely allied to *robusta* but in that species the "fifth antennal joint is prolonged at apex, and the last ventral has a very deeply impressed median line."

Synchroa punctata Newm. A rare species in Florida. Schwarz lists one specimen from Haulover and I took one, Feb. 27, and another, April 19, from beneath the bark of a dead red bay tree, *Persea borbonia* L.

Canifa pusilla Hald. One specimen July 15, at porch light. Described from South Carolina, frequent in Indiana, but not before known from Florida.

Tachygonus minutus, sp. nov.

Short, broadly oval. Black, strongly shining; legs and antennæ wholly testaceous. Beak reddish-brown, strongly shining, devoid of punctures; eyes large, almost contiguous; occiput very minutely and sparsely punctured. Thorax bell-shaped, coarsely and densely punctate on sides and with a large rhomboidal smooth space at middle, a tuft of white hairs near each hind angle and a thinner aggregation of similar hairs on sides. Elytra with double rows of coarse, deep punctures, each of which gives rise to a yellowish inclined seta; umbones promi-

19. Trans. Amer. Ent. Soc., IX, 1881, 54.
20. Trans. Amer. Ent. Soc., III, 1871, 50.
21. Trans. Amer. Ent. Soc., XXIII, 1896, 137.
22. Trans. Amer. Ent. Soc., XII, 1884, 26.
23. Can. Ent., XLVI, 1914, 142.
24. Journ. N. Y. Ent. Soc., XXVII, 339.

nent; intervals very narrow, the alternate ones feebly costate; a small divided and divergent sutural tuft of white hairs on basal third. Hind legs not much longer than the middle ones, armed on inner side with three or four minute teeth. Sides of meso- and metasterna coarsely punctate and clothed with white hairs. Length 1.3 mm.

Described from a single specimen taken April 19 by sweeping ferns in Skinner's hammock. Allied to *T. centralis* Lec., described from Colorado, but smaller, with head more finely punctate and sculpture of elytra very different.

Derolomus bicolor Lec. One specimen, April 23, from the leaves of a thistle on Hog Island. Known heretofore only from Enterprise, New Smyrna and Capron on or near the east coast of Florida.

Lixus leptosomus[25] Blatch. Two examples swept, April 11, from low herbage along the railway embankment north of Dunedin. The unique type from Sanford, Fla., was the only specimen hitherto known.

Barinus elusus, sp. nov.

Elongate, subparallel, convex. Black, shining; legs and antennæ reddish-brown; thorax with a broad stripe of transversely placed white scales on each side; elytra with the second intervals covered their full length with similar scales, bases of third, fourth and sixth intervals, side pieces of meso- and metasterna and sides of last three ventral segments similarly clothed. Beak stout, strongly curved, about three-fourths the length of thorax, very finely and sparsely punctate above, more coarsely on sides of basal half. Head finely alutaceous, finely and sparsely punctate. First joint of funicle two-thirds the length of the rest united. Thorax subcylindrical, one-fourth longer than wide, rather finely punctate, the intervals feebly alutaceous and equal in size to the punctures. Elytra scarcely wider at base and nearly twice as long as thorax, sides parallel to apical fourth, then strongly converging to the separately rounded tips; striæ narrow, deep; intervals flat, feebly alutaceous, each with a single row of rather fine, shallow, irregularly placed punctures. Under surface coarsely and densely punctate, the last three ventral segments more sparsely so. Length 3 mm.

Two specimens taken March 30, April 19 by sweeping along a roadway through Skinner's hammock. Allied to *cribricollis* Lec., but distinct in the more slender form, arrangement of white scales, longer thorax, alutaceous surface, etc.

Cylindrocopturus nanulus Lec. Five specimens beaten April 26 from the foliage of *Ampelopsis* in low, moist grounds. Known from Florida heretofore only from Enterprise.

25. Can. Ent., XLVI, 1914, 249.

Mailed December 13th, 1920

RHABDOPTERUS PICIPES Oliv.

Work of beetles on immature Grimes' Golden apples and on leaf of Virginia Creeper.

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POPULAR AND PRACTICAL ENTOMOLOGY.

The Cranberry Rootworm Beetle (Rhabdopterus Picipes) as an Apple Pest. (Coleoptera).

BY WESLEY S. SAWYER.
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On June 28, 1920 the writer's attention was called to a peculiar injury to apples in an orchard near Sodus, New York. Small, bronze-coloured leaf beetles were found in great numbers feeding on the fruit. They were later determined by Mr. Charles W. Leng as *Rhabdopterus picipes* Oliv. This beetle is widely distributed throughout the eastern United States, ranging westward to the Dakotas and Texas. The beetles have been recorded as feeding on the leaves of basswood, myrtle, wild grape, and on the foliage and fruit of the cranberry. In the larval stage the insect is a serious enemy of cranberry, attacking the roots.

In the orchard at Sodus the beetles confined their attack to the fruit, especially Grimes Golden, eating out a shallow, irregular, hieroglyphic-like channel on the surface (Plate VIII). About 75 per cent. of the apples were injured in this manner. The beetles continued feeding until about the middle of July, after which time they were to be found feeding on the foliage of Virginia creeper, dock, and wild strawberry. Apple leaves were not attacked. When feeding on the foliage the beetles ate out holes through the leaf, shaped very similar to the channels on the fruit (Plate VIII); in some cases riddling the leaves so that only the veins remained. About the first of August the beetles disappeared.

During the past season, the work of the insect seemed to be confined to the vicinity of Sodus and Savannah, New York. In the latter place it was most abundant on the foliage of wild strawberry and dock. The damage to the apples in this locality was not great.

Attempts to kill the beetles by spraying with arsenate of lead were unsuccessful. Arsenate of lead (powdered) five pounds in one hundred gallons of summer strength lime sulphur was applied with great thoroughness, without either killing the beetles or driving them away.

NEW LEPIDOPTERA FROM BRITISH COLUMBIA.

BY E. H. BLACKMORE,
Victoria, B. C.

NOCTUIDÆ.

Cænurgia erechtea Cram. form **parva** form. nov.

This form is the spring brood of *erechtea* and is distinguished from the typical or summer form by its uniformly smaller size, measuring 35 mm. in alar expanse as compared with 42 mm. in typical *erechtea*.

The colours and markings of both male and female are exactly the same as in *erechtea* but, of course, on a reduced scale. It flies in April and May, while *erechtea* is not on the wing until July and August.

Described from 10 specimens, 6 ♂'s and 4 ♀'s collected by the author.

Holotype.—♂, Victoria, B. C., April 29th, 1913.

Allotype.—♀, Victoria, B. C., April 22nd, 1912.

Paratypes.—5 ♂'s, Victoria, B. C., April 22nd, May 4th, 6th, 13th, 1913, April 22nd, 1917; 3 ♀'s, Victoria, B. C., April 18th, May 4th, 1913, May 13th, 1917.

Types and paratypes in author's collection.

LASIOCAMPIDÆ.

Tolype dayi, n. sp.

Male.—Palpi seal brown tipped with white; front seal brown; thorax slate-grey shading into pale grey on metathorax, with the usual brown crest of raised scales; abdomen dark slate-grey shading into lighter grey laterally. Primaries light grey with median and sub-terminal spaces dark grey; maculation very close to *velleda*, but differs in the course of the outer edge of the median space, which is more sinuate in the new species.

The sub-terminal space is much narrower in *dayi* than it is in *velleda* and is of a more even width throughout. Terminal line white; fringe grey, paler externally. Secondaries, basal area smoky; median band paler followed by a sub-terminal smoky band which is produced into an angle at vein 4.

Underneath much as above but paler and the maculation less distinct.

Female.—Front and thorax chalk white in contradistinction to the yellowish white of *velleda* Stoll, and *lowriei* B. & McD.; abdomen banded with dark and light grey and densely clothed with longish white hairs. Primaries very much paler than the male, and all the veins outlined in white.

In this sex there is a tendency in the dark grey sub-terminal space to become obsolete outwardly from vein 6 to inner margin, thus giving the lower half of the s. t. space the appearance of a narrow, dark band.

Secondaries same as in the male but much paler.

Expanse.—Male 34–35 mm. Female 41–42 mm.

Described from two males and five females all taken on Vancouver Island.

Holotype.—♀, Quamichan Lake, near Duncan, B. C., Sept. 3rd, 1915, G. O. Day, and in the collection of the author, through Mr. Day's kindness.

Allotype.—♂, Sluggett, V. I., Sept. 18th, 1916, W. Downes, and in the collection of the author, through the kindness of the captor.

Paratypes.—One male, Victoria, B. C., Sept. 1st, 1916, taken by the author and in his collection; 3 females, Quamichan Lake, V. I., Sept. 13th, 1906, Sept.

13, 1911, and Sept. 20th, 1914, G. O. Day, and in his collection; 1 female, Sluggett, V. I., Sept. 24th, 1916, W. Downes, and in his collection.

The last-named is somewhat damaged, being broken on inner margin of primaries.

The females vary in depth of colouring on primaries, one of the Quamichan Lake females being very dark, giving the insect a rather slaty-grey appearance.

I take much pleasure in naming this species after my friend Mr. G. O. Day, who has done much good work in describing the life-histories of many of our western species.

The following notes, given to me by Mr. Day, on the egg and cocoon of this species are of interest.

Egg.—"A female found at rest on Sept. 3rd, 1915, extruded 5 eggs when in the killing tin. The eggs were of a dark olive green, joined together end to end, and thinly covered with hairs from the tail of the parent moth. The hairs appeared to be fastened on by the sticky surface of the egg itself—sideways and irregularly. The surface of the eggs were pitted all over. The eggs were evidently infertile as they became concave on one side after a few days."

Cocoon.—"On a former occasion a cocoon was found on an old fence post, a small cavity having been made by the larva and covered by a tough web composed of silk and fragments of excavated wood. The cocoon resembled a blister on the post."

GEOMETRIDÆ.

Eustroma nubilata Pack. form **macdunnoughi,** form. nov.

This form differs from typical *nubilata* in having the ante- and post-median bands and the terminal area on the primaries wholly suffused with dark brown, which is only a degree lighter than the very dark median band. The extra-discal line is faintly shown as a narrow, white line which is more pronounced costally, while the crenulate s. t. line is also picked out in white.

The secondaries in the male have the basal area whitish, shading into dark fuscous from the extra-discal line outwardly, becoming deeper towards the margin, while in the female they are wholly suffused with brown, the suffusion being somewhat paler basally. It flies with typical *nubilata* and although not common, it occurs regularly every season. Named in honour of Dr. J. H. McDunnough, to whom I am deeply indebted for his kindly help and advice in my efforts to straighten out our British Columbia Lepidoptera.

Altar expanse.—Male 30–32 mm. Female 33–36 mm.

Described from 12 specimens, 8 males and 4 females, taken on Vancouver Island and the Lower Fraser Valley.

Holotype.—♂, Rosedale, B. C., June 19th, 1917, taken by the author and in his collection.

Allotype.—♀, Rosedale, B. C., June 23rd, 1917, taken by the author and in his collection.

Paratypes.—4 ♂'s, Goldstream, B. C., May 18th, 1915; Vancouver, B. C., June 18th, 1917; Rosedale, B. C., June 23rd, 27th, 1917, taken by the author and in his collection; 1 ♂, Vancouver, B. C., May 7th, 1905, R. V. Harvey, and now in the author's collection; 1 ♂, Chilliwack, B. C., June 26th, 1918, W. B. Anderson, and in his collection; 1 ♂, Fraser Mills, B. C., July 20th, 1920,

L. E. Marmont, and in his collection; 2 ♀'s, Rosedale, B. C., June 24th, 1917, Cloverdale, B. C., June 15th, 1917, taken by the author and in his collection; 1 ♀, Duncan, B. C., June 28th, 1895, E. M. Skinner, and now in the author's collection.

Dysstroma sobria Swett. form **swetti.,** form. nov.

In the Can. Ent., Feb., 1917, p. 64 et seq., Mr. L. W. Swett gave a paper on the genus *Dysstroma*, in the course of which he described some new abberations, or, as I would prefer to call them, forms of our large Vancouver Island species, which he had at that time identified as *mulleolata* Hulst.

There has been considerable doubt as to what Hulst's *mulleolata* really is, Mr. L. B. Prout, of London, Eng., being the first one, I believe, to associate this large form with *mulleolata* (vide Trans. Lon. Ent. Socy., 1908, p. 38). Drs. Barnes & McDunnough in further notes on this genus (Cont. Lep. No. Amer., Vol. 3, No. 4, March, 1917, p. 228), accepted Mr. Swett's identification of *mulleolata*, although with a certain amount of reserve, as there were several discrepancies between Hulst's type and his description. Later, (ibid., Vol. IV, No. 2, May, 1918, p. 137) on an examination of the type specimen by Dr. McDunnough, the authors came to the conclusion, for reasons which are clearly set forth and which seem exceedingly logical, that Hulst's *mulleolata* is the smaller, white-banded form of *citrata* L, which Mr. Swett had previously called *punctum-notata* Haw. This is the form which in favourable years is very common on Vancouver Island in the month of August.

Accepting Barnes' & McDunnough's identification of *mulleolata* to be correct, (and with which I fully agree) will leave our large, white-banded form without a name. According to the rules of the International Code, the first-named form ,i. e., *sobria*, given by Mr. Swett, will stand for the group collectively, and I propose to give the name *swetti* to the white-banded form, a description of which follows:

Head, front and palpi, cinnamon brown, thorax the same, intermingled with a few lighter hairs. Primaries, basal area dark brown, followed by another white line, slightly sinuous. The central area is white, irregularly bordered with black anteriorly and posteriorly, the posterior portion being wider and more pronounced costally. The amount of white in the central area is somewhat variable, especially between the sexes, the females as a general rule having a much larger proportion of white than the males. The outer border of central area is edged narrowly with white, while contained within the white area is a black linear discal mark. The subterminal area is tawny, shading into dark brown, especially opposite the discal mark, where it appears as a dark diffused blotch. The s. t. line is white, dentate, and rather faint. There is a small, yellowish-white sub-apical mark on the costa. Fringe pale, darker at the termination of the veins.

Secondaries, dark fuscous with the extra-discal line distinctly outlined in a paler shade and being acutely angled between veins 3 and 4. Black discal dots small but distinct.

Underneath primaries dark fuscous with central area showing through darker, a large yellowish patch on costa. Secondaries same colour with extra- and intra-discal lines strongly marked. Discal spots reproduced on all wings

but those on secondaries larger and more prominent. Alar expanse—males, 35–37 mm., females 38–40 mm.+

I take great pleasure in naming this form after Mr. L. W. Swett, who has done a great deal of pioneer work in this group, and to whom I owe much of my present knowledge of the Geometridæ.

Described from five males and five females, all taken by the author at Victoria, B. C.

Holotype.—♂, Victoria, B. C., June 20th, 1914.

Alloiype.—♀, Victoria, B. C., May 22nd, 1915.

Paratypes.—4 males, Victoria, B. C., June 22nd, 1914, June 24th, 1915, July 17th and 22nd, 1920; 4 females, Victoria, B. C., June 16th, 1914, June 24th and 26th, 1915, July 17th, 1920.

Types and paratypes in the collection of the author.

It is easily distinguished from *mulleolata* on account of its larger size, its ruddier appearance, and the shape of the extra-discal line on secondaries. Also by the fact that normally *swetti* flies in June, while *mulleolata* makes its appearance in August.

This year, being an abnormally late year, *swetti* did not apparently emerge until the beginning of July, as the specimens that I took on the 17th and 22nd of that month were a little worn and had been on the wing for at least a couple of weeks.

The list of species in this particular section of the genus *Dysstroma* will now stand as follows:—

Dysstroma

citrata Linn.

form *immanata* Haw.

mulleolata Hulst = *punctum-notata* Swett. (nec Haw.).

sobria Swett.

form *subumbrata* Swett.

form *ochrofuscaria* Swett.

form *swetti* Blackmore = *mulleolata* Swett. (nec Hulst).

I do not think that *mulleolata* will prove to be a valid species, but will eventually turn out to be a form of *citrata:* for the present, however, it will be better to leave it as it stands until the life-histories of the various *citrata* forms can be worked out.

Eulype albodecorata, nov. sp.

This new species is very closely allied to *hastata* L., and had perhaps better be described in a comparison with that well-known species.

Palpi, head, thorax and abdomen as in *hastata.* Primaries, basal area black, followed by a narrow white basal line, which is gently curved from costa to inner margin. Sub-basal band black and wider, similarly curved. An irregular ante-median band, white, and about the same width as sub-basal. The broad black median band so characteristic of typical *hastata* is in this species broken up and considerably intermingled with white. Post-median white band rather narrower than in *hastata*, especially costally, with black spots on the veins. The spots vary in number; in some specimens there is a spot on each

vein, while others have spots on only two or three veins. Terminal area and sagittate mark as in *hastata*.

Secondaries.—It is on these that the most striking difference occurs, the large black basal area of *hastata* giving place to a small, dusky basal patch, the rest of the wing, nearly to the outer margin, being clear white, with the exception of a narrow, irregular, broken, black, post-median band which is more pronounced in the holotype than in most of the other specimens. The black outer margin is slightly narrower than in *hastata*. Underneath, all the markings of the upper side are reproduced in detail. Another slight difference which appears fairly constant is in the fringe of the primaries, which in *hastata* is regularly and evenly black and white checkered, but in *albodecorata* it is quite black from the apex to the sagittate mark, below which it becomes as in *hastata*.

Alar expanse 31–34 mm.

Described from 28 specimens, 14 ♂'s and 14 ♀'s taken by the author at Goldstream, B. C.

Holotype.—♂, Goldstream, B. C., June 7th, 1916.

Allotype.—♀, Goldstream, B. C., May 18th, 1915.

Paratypes.—13 ♂'s, Goldstream, B. C., May 8th, 20th, 1915; June 11th, 1913; June 3rd, 1915; June 6th, 7th, 8th, 1916; 13 ♀'s, Goldstream, B. C., May 8th, 1915; June 3rd, 1915; June 6th, 7th, 9th, 1916; July 4th, 6th, 1916.

Types and paratypes in the author's collection.+

At first I thought this new species was a white form of *hastata*, but having had both species under observation for several years, I came to the conclusion that they were distinct.

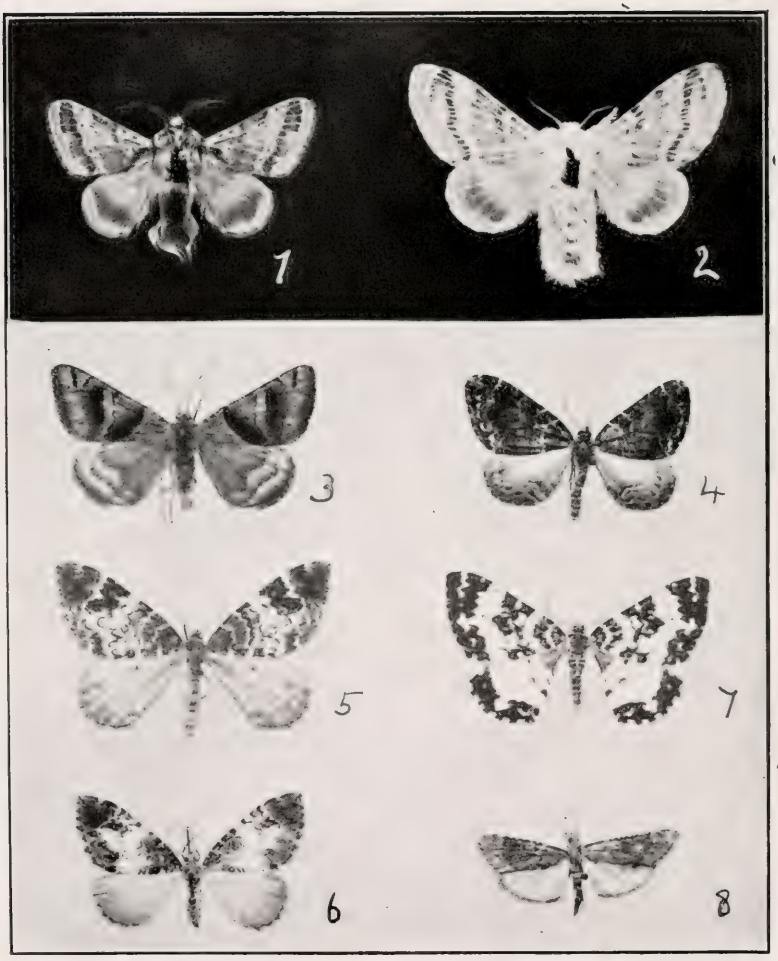
In the first place, *albodecorata* is on the wing from a week to ten days earlier than *hastata*, although the date of appearance depends upon the season. During the years 1915-16 and '17 I gave special attention to the dates of their appearance, and although the season varied in each of those three years (1915 being an especially early year) *hastata* never put in an appearance until the new species had been flying for at least a week. Secondly, although both species are subject to a certain amount of variation within certain limits, I have never known them to intergrade and when one is acquainted with both species, it is comparatively easy to sort them out by their general habitus.

PYRALIDÆ.

Herculia florencealis, nov. sp.

Palpi deep yellow with a few scattered red and black scales exteriorly. Face and head light fawn, thorax a darker shade of same colour. Antennæ fawn, but the scales on each segment are dark tipped, giving them an annulated appearance. Abdomen deep cream colour, each segment ringed with dark brown, posteriorly. Primaries, basal area fawn colour, with a few scattered black scales which are accentuated along the costal region, central area a wide brown band with its interior edge strongly dentate from costa to inner margin; the exterior edge extends obliquely outward from costa to veing b, thence curving gently inward to inner margin and being finely crenate.

On the costal margin of this band are five small sub-quadrate yellow patches. Bordering the wide median band is a narrow yellow streak beginning at costa where it is widest and extending to vein 6 where it becomes obsolete. The



NEW LEPIDOPTERA FROM BRITISH COLUMBIA.

(See p. 266).

terminal area is the same colour as the basal area, with a faint reddish-brown shade running through it. Marginal line dark brown. Fringe dark fuscous.

Secondaries white, overlaid with fuscous scales; a prominent darker curved line runs through the centre of the wing, with another line, less distinct paralleling it exteriorly. Marginal line distinct, dark fuscous. Fringe lighter than primaries with a dark band running through it. Underside, primaries from base to outer fourth, dark fuscous, terminal area lighter with a diffused reddish sub-apical patch and the five yellow sub-quadrate patches showing through on costal margin. Secondaries, light fuscous with the prominent dark line showing through, the second parallel line not being reproduced. Alar expanse 16 mm.

Holotype.— ♀, Rossland, B. C., July, 1900. Taken by the late W. H. Danby, and now in the collection of the author.

I am indebted to Dr. J. McDunnough for the generic determination.

Paratypes of the foregoing new species and forms will be placed as far as they will permit, in the Canadian National Collection, Ottawa, Ont., and the Provincial Museum of Natural History, Victoria, B. C.

Explanation of Plate IX.

1. *Tolype dayi* Blackmore. Allotype, male.
2. *Tolype dayi* Blackmore. Holotype, female.
3. *Caenurgia erechtea parva* Blackmore. Holotype, male.
4. *Eustroma nubilata macdunnoughi* Blackmore. Holotype, male.
5. *Dyssiroma sobria swetti* Blackmore. Holotype, male.
6. *Dysstroma mulleolata* Hulst. With which *swetti* has been misidentified.
7. *Eulype albodecorata* Blackmore. Holotype, male.
8. *Herculia florencealis* Blackmore. Holotype, female.

A SYNOPSIS OF THE ANTHOMYIID GENUS TRICHOPTICUS RONDANI (DIPTERA).

BY J. R. MALLOCH,
Urbana, Ill.

I have placed in this genus all species of the subfamily Phaoniinæ which have setulose hairs on the posterior upper margin of the hind coxæ. The species which have been placed in the genus *Allœostylus* Schnabl differ in habitus and hypopygial structure from those which belong strictly to *Trichopticus*, but I have included them here because the females are so similar to those of the true species of this genus that there is nothing to be gained by separating them, the more so as they are similar in habitat, all species being found in the north or in mountainous country. I have not seen any species of the genus as here

defined from the southern United States, Central or South America, Africa, Australia or any part of Asia, though there is a likelihood of their occurrence in Tibet.

Key to Species.

MALES.

1. Hind tibia with a strong fasciculate apical thorn on ventral side.....2.

   Hind tibia without such thorn, sometimes with one or two bristles.....3.

2. Yellow species of robust habitus.....*diaphanus* Wiedemann.

   Black species of slender habitus.....*coquilletti* Malloch.

3. Legs largely or entirely yellow; hind tibia with setulose hairs and a few long bristles; thorax with two pairs of strong presutural acrostichals...4.

   Legs entirely black; hind tibia usually with long, soft hairs in addition to a few hairlike bristles.....5.

4. Hind femur stout and straight, with rather long dense hairs on posterior and posteroventral surfaces; antennæ black; mid tibia with one or two anterodorsal bristles.....*conformis* Malloch.

   Hind femur slender, curved, with a few posteroventral bristles on apical third; base of third antennal segment rufous; mid tibia without anterodorsal bristles.....*latipennis* Malloch.

5. Abdomen with paired dorsal spots; hind tibia without posterodorsal bristles; thorax with three pairs of postsutural dorsocentral bristles.....*maculiventris* Malloch.

   Abdomen without paired dorsal spots; hind tibia with one or more posterodorsal bristles.....6.

6. Fore tibia with several strong spines on posteroventral surface near apex..7.

   Fore tibia without spinose armature as above, sometimes with a few hairlike bristles.....10.

7. Fore tibial spines four in number, in a single series; mid tarsus without a fringe of fine hairs on apical three segments.....*fimbriatus* Coquillett.

   Fore tibia with the spines in two vertical series; mid tarsus with a fringe of fine hairs on posteroventral edge of the apical three segments.....8.

8. Fore tibia with three spines; mid tarsus long and slender, fourth segment at least twice as long as wide.....9.

   Fore tibia with four spines; mid tarsus short and stout, fourth segment as wide as long.....*septentrionalis* Stein.

9. Halteres yellow; mid femur with a number of long hairs on basal half of posteroventral surface.....*diffinis* Malloch.

   Halteres black or brown; mid femur without such hairs.....*spiniger* Stein.

10. Thorax with three pairs of postsutural dorsocentral bristles; mid tibia with one or two bristles on anteroventral and posteroventral surfaces ..... *melanderi* Malloch.

Thorax with four pairs of postsutural dorsocentral bristles ..... 11.

11. Halteres and calyptræ yellow; mid femur with a conspicuous group of dense, stiff, obtusely pointed bristles on apical third of anteroventral and ventral surfaces, and a series of about 8 very long, strong bristles extending from base to beyond middle of posteroventral surface ..... *johnsoni* Malloch.

Halteres black or dark brown, calyptræ whitish; mid femur not armed as above ..... 12.

12. Second, third and fourth segments of mid tarsus with a fringe of very fine hairs along posteroventral margin; mouth-margin very much produced; arista with very short pubescence; hind tibia with a series of erect setulose hairs on anterodorsal surface, one or two of which are longer than the others, the hairs of entire series at least as long as the diameter of tibia ..... *subrostratus* Zetterstedt.

Mid tarsus without hairs as above; mouth-margin not produced ..... 13.

13. Hind tibia without strong bristles on anterodorsal surface, the hairlike bristles on anteroventral surface much longer than the posterodorsal bristles, which number from five to seven; fore tibia with dense, moderately long hairs on ventral surfaces; mid tibia with a number of bristly hairs of irregular lengths on apical half of ventral surface ..... *villicrurus* Coquillett.

Hind tibia with two long bristles on anterodorsal surface, the anteroventral bristles not longer than those on the posterodorsal surface ..... 14.

14. Mid tarsus distinctly shorter than mid tibia; longest hairs on arista about twice as long as its basal diameter; abdomen with a broad black triangle on dorsal segments 2 and 3; preapical dorsal bristle on hind tibia strong ..... *breviiarsis* Malloch.

Mid tarsus distinctly longer than mid tibia; longest hairs on arista about as long as its basal diameter; abdomen with the black dorsal marks on segments 2 and 3 nearly linear; preapical dorsal bristle on hind tibia weak or absent ..... *innocuus* Zetterstedt.

FEMALES.

1. Thorax and abdomen yellow ..... *diaphanus* Wiedemann.

Thorax and abdomen black ..... 2.

2. Abdomen with paired dorsal spots; hind tibia without posterodorsal bristles; thorax with three pairs of postsutural dorsocentral bristles ..... *maculiventris* Malloch.

Abdomen without paired dorsal spots ..... 3.

3. Legs largely or entirely reddish or yellowish..... .....4.

   Legs entirely black.....5.

4. Thorax with two pairs of strong presutural acrostichal bristles; mid tibia with one or two anterodorsal, and two posteroventral bristles besides the posterodorsals.....*conformis* Malloch.

   Thorax with two pairs of weak presutural acrostichal bristles; mid tibia without anterodorsal and posteroventral bristles.....*latipennis* Malloch.

5. Thorax with three pairs of postsutural dorsocentral bristles.....6.
   Thorax with four pairs of postsutural dorsocentral bristles.....7.

6. Mid tibia with an anteroventral and a posteroventral bristle.....*melanderi* Malloch .

   Mid tibia without an anteroventral and a posteroventral bristle .....sp.?

7. Glossy black species, thoracic dorsum with lateral margins and a narrowly divided central vitta white pruinescent; arista almost bare; hind tibia with two bristles on posterodorsal surface, the larger one apicad of the smaller, situated at or just beyond middle of tibia; lower margin of cheek gently curved in outline, with a very strong, upwardly curved bristle before middle in addition to the other marginal bristles.....*johnsoni* Malloch.

   Species not glossy black, at least the thorax with dense, uniform grayish pruinescence; bristles on hind tibia not as stated above.....8.

8. Hind tibia with one posterodorsal bristle about one-third of the tibial length from apex, anterodorsal surface with two bristles; face almost vertical in profile, the mouth-margin but little produced, almost in vertical line with base of antenna; margin of cheek with a few bristly hairs, one or two of which, near anterior margin, are upwardly directed; halteres yellow.....*innocuus* Zetterstedt.

   Hind tibia with two or more posterodorsal bristles.....9.

9. Halteres black; mouth-margin very much produced anteriorly, projecting very much beyond the vertical line of base of antenna; base of wings not yellowish; abdomen not densely pruinescent..*subrostratus* Zetterstedt.

   Halteres yellow; mouth-margin not much produced anteriorly, hardly projecting beyond the vertical line of base of antenna; wings yellowish at bases; abdomen very densely pruinescent.....10.

10. Fore tibia with a strong bristle near apex on posteroventral surface.....*septentrionalis* Stein.

    Fore tibia without such bristle.....*spiniger* Stein.

N. B.—Holmgren's species *frenatus* which has been placed in Lasiops or Trichopticus by authors belongs, according to my interpretation of generic limits, to Phaonia.

THE NERVOUS SYSTEM OF THE LARVA OF *STHENOPIS THULE* STRECKER.

BY J. M. SWAINE,
Entomological Branch, Ottawa.

The Nervous System of insects is usually treated under two divisions, the Central System and the Sympathetic System. The two are so very intimately connected in the caterpillars of the Lepidoptera that there would appear to be little reason for separating them.

The Central System.

There are included here the cerebral ganglia and their commissures, with the continuing ventral chain of ganglia and connectives, together with the chief nerves to which they give rise.

The supraoesophageal ganglion, or brain, lies within the head upon the dorsal wall of the pharynx; it is connected by the crura cerebri, stout connectives which pass around the pharynx, to the suboesophageal ganglion lying immediately below the fore-intestine. The nerves arising from these two cerebral ganglia furnish practically all the nerve supply to the head.

The suboesophageal ganglion forms the first of a single chain of ganglia and connectives lying upon the ventral muscles along the median line. There is one ganglion in each thoracic segment and one in each of the first eight abdominal segments. The ganglia are jointed together by connectives, the whole forming a single median chain. The primitive double connectives have been completely fused into a single stout cord throughout the entire length of the chain: even in the thorax, where all caterpillars outside the Jugatæ have double connectives, they are as firmly fused as in the abdomen. The only indication of the primitive double nature of the cord is shown in the slight longitudinal split in the connective immediately in front of each ganglion, from which the median nerve arises. The fusion of the connectives in the thorax is a most interesting character, the more so since it appears in conjunction with the presence of a distinct eighth abdominal ganglion.

Most caterpillars have only seven abdominal ganglia, with the last more or less evidently composite. In *thule* and *argenteomaculatus* the eighth ganglion, composite in itself, is separated from the seventh by a connective nearly as long as that between the seventh and the sixth ganglia.

Each ganglion of the ventral chain lying behind the suboesophageal gives to its segment typically two pairs of nerves. The anterior pair evidently represent the primitive lateral nerves of the connectives, which in this group have migrated backwards until they appear now as the nerves from the ganglia. The nerves of the last ganglion, three pairs in all, are discussed below.

The Brain.

Pl. X, Fig. 8.

The Brain, or the Supraœsophageal Ganglion, is situated on the meson a little behind the middle of the head and well below the dorsal wall. It is very distinctly bilobed, rounded before and behind, and towards the front extended latero-ventrad to the nerves and the crura. The median line is deeply impressed so that the appearance is decidedly that of two ganglia united along the middle line.

The optic, antennal, and fronto-labral nerves arise close together on each side from the cephalo-lateral extension in front of the commissures.

The Optic Nerve, Opt., Fig. 8, is closely connected with the other two at the base and often with the antennal for a considerable distance. It runs cephalad and laterad, curving behind the dorsal condyle of the mandible and ends abruptly on the hypoderm below the cluster of eyes. From its extremity on or in the hypoderm fine branches proceed to the individual eyes. The Optic is usually closely connected for a portion of its length with the cephalic nerve of the lateral sympathetic.

The Antennal Nerve, Ant., Fig. 8, frequently appears firmly united at its base with the fronto-labral, giving the latter the appearance of a three-branched nerve; in other specimens it can be distinctly traced backward to the ganglion. It extends cephalad and lateral with the optic, curves sharply caudad and ventrad behind the dorsal condyle of the mandible and enters the base of the antenna, giving nerve-threads to the nerve-like antennal muscles on its way as well as to neighbouring setae. It sometimes lies immediately behind the optic for a considerable part of its length, crossing below the latter beyond the mandibular condyle on its way to the antenna.

The Fronto-labral Nerve, Fig. 8, arises, as already stated, in close conjunction with the antennal and optic. It proceeds directly cephalad along the side of the oesophagus, or pharynx, and presently divides into two main branches. The mesal division, or sympathetic branch, curves regularly to the frontal ganglion upon the meson, and may be considered a part of the sympathetic. It has no branches. The lateral division, or the labral nerve proper, extends directly cephalad to innervate muscles of the pharynx and labrum, and to give certain fibres to the sympathetic. Slightly cephalad of the frontal ganglion it becomes considerably widened and gives off several branches. One passes dorso-mesad to retractor muscles of the pharynx; a slender unbranched strand, "S.br.2", connects the labral nerve with the cephalic ganglion, "c.ge.", of the median nerve; a stouter mesal branch, "m.br.", runs cephalad along the side of the pharynx and enters the labrum; a fourth branch, "ph.br.", passes to the lower part of the side of pharynx and immediately divides into three main branches which innervate that region. The mesal branch of these is directly connected with a ganglion of a sympathetic plexus, "s. gl.," lying upon the hypoderm of the wall of the mouth, and is through the branches of this plexus connected with the cephalic branches of the median nerve. The main division of the labral nerve, L., innervates the labral muscles, as indicated on the figures. The outermost branch runs cephalo-laterad in conjunction with the mandibular nerve of that side, but curves sharply mesad at its tip, giving numerous strands to the lateral muscles of the labrum. The details of its branching are shown on the figures. The two connections with the sympathetic vary considerably in different individuals. In one specimen these two sympathetic connections seemed to be united, one strand from the labral nerve uniting with the plexus, which in turn was connected with the cephalic ganglion.

The optic, antennal and fronto-labral nerves are variably fused at the base; in some individuals the three are united for a third their length, so that one enormous nerve leaves the brain on each side.

On one specimen, extremely delicate fibres were distinguished running from the ventral face of the brain to the heart immediately below. There were three, one in the middle and one on each side. Whether these are of nervous or connective nature I am unable to say.

The brain is abundantly supplied with tracheoles from neighbouring tracheae.

The Suboesophageal Ganglion.

Pl. X, Fig. 9.

The Suboesophageal or Infraoesophageal Ganglion is a large, flattened, somewhat quadrate ganglion, lying in the caudal part of the ventral portion of the head. It is connected with the supraœsophageal ganglion by the Crura Cerebri, as already described, and, by a very short commissure, is connected with the first thoracic ganglion, thus becoming the cephalic ganglion of the ventral chain.

It gives origin to four pairs of nerves. The first three pairs arise from the cephalic part of the ganglion, at the sides, mesad of the ventral origin of the commissures.

The Mandibular Nerves, Fig. 9. The most anterior pair, the Mandibular Nerves, extend cephalad, more or less parallel with the other two pairs, though usually lateral to them, as far as the ventral condyle of the mandibles. They then turn abruptly and proceed almost directly to the dorsal side of the mandibles in rather close relation with the external branch of the labral. Before reaching the mandible each mandibular nerve bifurcates, the two divisions running nearly parallel to each other. At the entrance to the mandible the cephalic branch enters the mandibular ganglion, which innervates the interior of the mandible, and certain of the mandibular muscles, particularly the retractors (see Fig. 1); while the caudal division proceeds laterad above the ventral condyle and divides into a dorsal and ventral branch. The position of these branches is explained on Fig. 1. The ventral branch extends to the base of the head to innervate various muscles of that region.

A delicate branch from the mandibular nerve fuses on the middle line with its fellow from the opposite side, and the two are continued cephalad as a median strand into the hypopharynx, which it innervates. Before reaching the median nerve each of these branches from the mandibular gives rise to a slender thread which joins the plexus of minute threads lying upon the hypoderm below the mouth.

The Maxillary Nerves, Fig. 9. The second pair, the Maxillary Nerves, extend cephalad nearly parallel with the labial, and bend laterad behind the union of the silk glands to innervate the muscles and sense organs of the maxillae.

The Labial Nerves, Fig. 9. The third pair, the Labial Nerves, proceed cephalad along the sides of the oesophagus and pharynx to innervate the region of the labium. They seem clearly to innervate muscles and glands and to be directly connected with the cutaneous sympathetic; the branches are illustrated in the figures. On some specimens there is an unbranched connective uniting the labial nerves behind the fusion of the silk glands.

Near the union of the silk glands each labial nerve gives a short, thickened branch to the median line. The two branches unite in an elongate ganglion,

"M. g.", bifurcating cephalad, which lies upon and innervates the glandular area of the outer part of the mentum.

The Ventral Nerve of the subesophageal ganglion passes to a lateral ganglion lying in front of the first spiracle, which in turn innervates the muscles of that region and sends two strands to the silk gland of its side. The ganglion is connected with a nerve plexus lying among the main tracheal branches, interwoven with a string of gland-like cells, oenocytes, and many tracheal threads. This plexus is in turn connected with the cephalic branch of the bracheal nerve.

The Commissures.

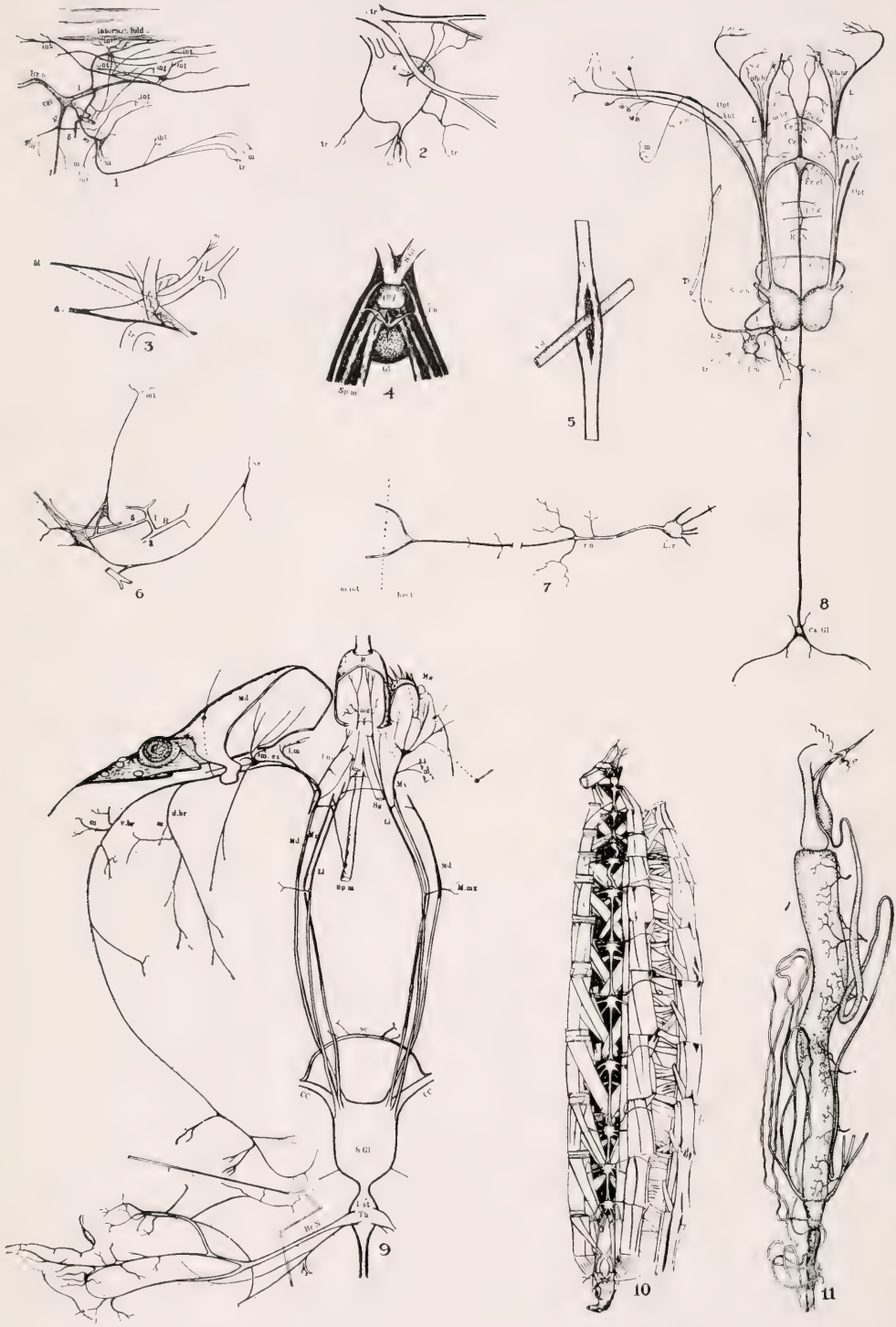
The Suboesophageal Commissure arises from the brain in conjunction with the Crura Cerebri. It soon separates from the latter and passing ventrad and somewhat cephalad forms a complete loop around the oesophagus. Near the middle line below the oesophagus it gives two or more pairs of delicate fibres to pharyngeal muscles. It is a rather stout cord and must have some function other than these small branches would indicate. It assists greatly in holding the brain in position and that is probably its chief use.

The Crura Cerebri proceed from each side of the brain downward and backward to connect with the suboesophageal ganglion below the oesophagus. They are unbranched.

The First Thoracic Ganglion, Pl. X, Fig. 9; Pl. XI, Fig. 2, gives rise to two pairs nerves. The smaller, superficial pair, "A," Pl. XI, Fig. 2, probably represent the nerves of the connectives between this ganglion and the suboesophageal ganglion; they innervate chiefly the superficial muscles, with threads to the hypoderm, passing across the tracheae eventually to the dorsal muscles and integument. The second pair, the Brachial Nerves, "B", divide each into a cephalic and a caudal division. The former innervates muscles in the base of the head, by the recurrent branch, and the anterior part of the prothoracic segment. and is connected with the superficial nerve. An important branch, "5", from the base of the cephalic division passes into the leg. The posterior division gives a branch, "3", innervating numerous muscles, and then, "4", passes directly into the leg.

The Third Thoracic Ganglion. The arrangement of the nerves from the second and third thoracic ganglia are illustrated in Pl. XI, Fig. 5. The Superficial Nerve, "A", passes outward beneath the recti muscles giving many branches to muscles, tracheae and integument. It has two or three connections with the anterior branch of the median nerve of its side. The Brachial Nerve, "B", passes directly to the base of the leg and there gives three branches from a more or less distinct coxal ganglion. The cephalic division, "1", innervates deep muscles and the integument, giving a stout strand, "5", to the leg. The remaining two branches "3" and "4 ', represent the caudal division described for the first thoracic ganglion. Nerve "3" goes to muscles and integument of the caudal part of the segment, and nerve "4" goes to the leg. Nerves "1" and "3" lie below nerve "A".

The First Abdominal Ganglion, Pl. XI, Fig. 6. This ganglion gives rise to two pairs of nerves; the anterior, "A", evidently represents the primitive lateral nerve of the connective which has migrated caudad and become fused with the degenerate brachial nerve, and the posterior, "C", is possibly the posterior



NERVOUS SYSTEM OF LEPIDOPTERA.

(See p. 275).

division of the median nerve which has fused with the ganglion. Nerve "A" is the chief nerve of the segment. It passes beneath the major recti muscles, giving off a minor, posterior division, "D", and extends across the tracheae to dorsum, innervating muscles, tracheae and integument. It has several connections with the median nerve. Nerve "C" passes backward to unite with a branch from the median nerve of the second abdominal segment, and gives off three main branches, chiefly to the integument. In the segments having prolegs a branch to the proleg of that side is given off from nerve "C" at the point marked "x" on figure 6 of the 2nd ganglion.

The Eighth Abdominal Ganglion, Pl. XI, Fig. 4, possibly represents the united 8th and 9th primitive ganglia. The median nerve is found as usual. The first pair, A, are of the normal type, representing the nerves of the primitive connectives and belonging to the 8th ganglion; the pair, "C", probably represent the second pair of the 8th ganglion. They innervate many muscles and the hypoderm of the 8th segment. The last pair, "D", stouter than the others, go to the last two segments of the caterpillar and to the caudal end of the intestine. They give off numerous branches to all the organs of that region, presenting two large ganglia of varying shape in different individuals.

There is little doubt, from the number of its nerves and its position, that the eighth ganglion in *thule* is composed of the united eighth and ninth primitive ganglia. Nerves "A" and "C" evidently belong to the primitive eighth ganglion, and nerve "D" would, therefore, represent the fusion of those of the ninth ganglion. That "D" is a composite nerve has been suggested by DuPorte and it seems probable from its size, extensive branching, and the passage of the vas deferens through it. This last peculiar condition was described by DuPorte in *Sphida obliqua*. It occurs also in *thule* but apparently not invariably, since I was unable to demonstrate it in several specimens. In *thule* the vas deferens normally passes at right angles directly through the middle of a chief branch of the nerve between the two main lateral ganglia. This condition would apparently be explained best as resulting from a fusion of the two nerves or two branches of the same primitive nerve. The median nerve of the ninth ganglion has disappeared or fused with "D".

The Sympathetic System.

The so-called sympathetic system of insects is usually divided into two or three groups of nerves and ganglia, all of which are very intimately connected with the central system. These are, the Supraintestinal Sympathetic System, comprising the Unpaired Median and the Paired Lateral groups of nerves and ganglia; and the Subintestinal Sympathetic System, or Paired Median Section, comprising the Median Nerves of the ventral chain. In addition to these there is a very delicate network of minute nerve threads and ganglia lying upon the hypoderm, and connected through numerous fine threads with the Central System as well as with the three divisions of the Sympathetic. This has been referred to as the Peripheral or Sensory Sympathetic System.

The Unpaired Median Section.

Pl. X, Fig. 8.

This minor group lies upon the dorsal face of the fore intestine to which its fibres mainly go. It comprises the Frontal Ganglion and the Cephalic and

Recurrent Nerves. The Frontal Ganglion lies upon the middle line of the fore-intestine well in front of the brain. It receives on each side the large sympathetic branches of the fronto-labral, called the Arched Nerves, and gives rise to the Cephalic Nerve in front, and to the Recurrent Nerve behind. The Cephalic Nerve passes directly forward along the middle line of the intestine to the base of the clypeus; here it enlarges to form the Cephalic Ganglion which gives two pairs of nerves to the intestine and receives on each side a slender thread, the Minor Arched Nerves, or the second sympathetic branch from the fronto-labral nerve. The frontal nerve bifurcates at the anterior end of the cephalic ganglion and each branch gives many threads to the muscles of that region. One of these threads is connected through a minute ganglion of the peripheral sympathetic system with a slender branch from the fronto-labral ganglion.

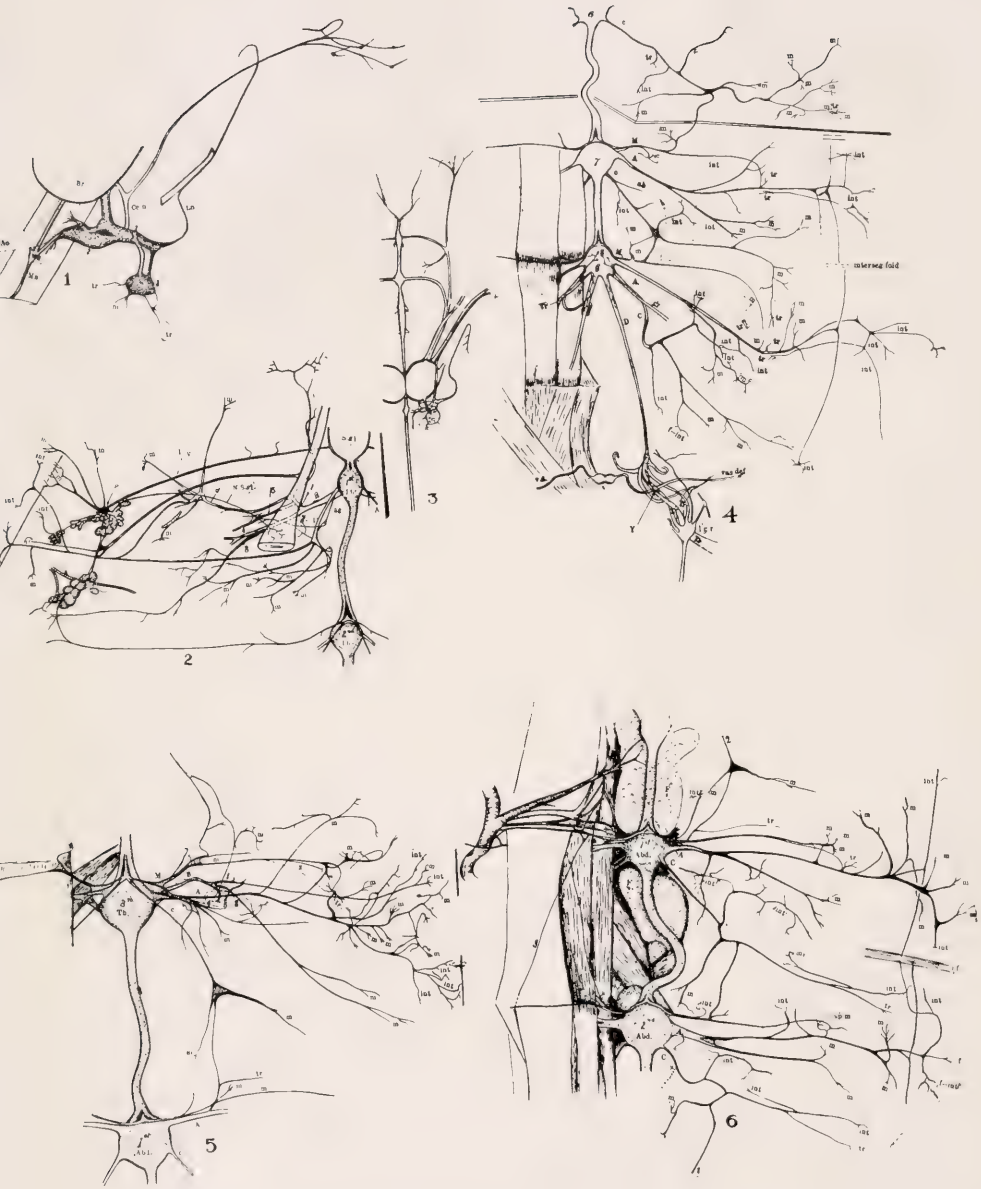
The Recurrent Nerve passes backward from the frontal ganglion as a slender strand along the median line of the intestine, beneath the heart and brain, and expands into a Caudal or Stomachic Ganglion at the base of the oesophagus. From the caudal ganglion several filaments arise as well as two larger nerves which were traced for a short distance one along each side the mid intestine. Nearly midway between the frontal ganglion and the brain the recurrent nerve expands into an elongate ganglion which gives three pairs of lateral nerves to the fore-intestine. A short distance behind the brain the nerve again enlarges slightly, forming a minute Median or Hypocerebral Ganglion connected by a delicate thread with the second ganglion of the paired lateral group. Along its course the recurrent nerve innervates the fore and midintestine, and certain delicate threads were noticed to enter the wall of the heart.

The Paired Lateral Section.

Pl. X, Figs. 2 and 8; Pl. XI, Figs. 1 and 3.

The arrangement of this plexus of ganglia and nerves varies considerably in different specimens. Usually there is found a short nerve arising from the side of the caudal part of each half of the brain. This nerve enlarges directly to form a fusiform ganglion, "1", Pl. X, Fig. 8, which gives rise by short nerves to two others. One of these, "2", fusiform in shape, innervates that part of the intestine immediately behind the brain, sends fibres to the heart, and one to the cephalic ganglion of the median nerve. This ganglion sometimes arises directly from the brain by a separate commissure, but is always closely connected with the first ganglion. The third ganglion, "3", of this lateral sympathetic section is nearly circular, flattened, and connected with the first ganglion by two short nerves; it supplies the fan-shaped muscles of the oesophagus and the neighbouring tracheae. What I have called the first ganglion is sometimes but little enlarged and then appears more like a stout nerve, but as a rule there are three distinct ganglia. The first ganglion, besides apparently giving delicate threads to the tracheae with which it is always in close contact, gives off two very interesting nerves, the Sensory and the Lateral Nerves.

The Sensory Nerve passes from the cephalic face of the ganglion cephalad past the brain, to which it is joined by a short connective, and is continued latero-cephalad in close connection with the optic nerve, which it finally leaves, and



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bifurcates to innervate various setae on the laterodorsal wall of the head. The second, the lateral Nerve, arises from the outer end of the first ganglion and passes laterad and then cephalad, in close connection with a tracheal branch, bending ventrad and innervating certain muscles at their attachment to the ventral wall. In *argenteomaculatus* larvæ, Pl. XI, Fig. 3, the arrangement of this group is closely similar to that just described, but there are, as in many other parts of the nervous system, constant differences. An instance of this occurs in connection with the third ganglion, which has there a direct connection with the caudal part of the brain.

A tracheole crosses the inner face of the 3rd lateral ganglion in *thule* and extends into minute tracheoles which mainly supply the lateral fan-like muscles of the oesophagus, innervated by the 2nd ganglion.

Crossing this tracheole, and extending from the caudal part of the inner face of the 3rd ganglion, is a minute rather elongate ganglion giving threads to the tracheoles entering the brain, Pl. X, Fig. 2.

The Paired Median Section.

This consists of the so-called Median Nerves of the central system, with their branches, and there seems to be little reason for treating it as separate from the ventral chain. The Median Nerve appears in front of each ganglion of the ventral chain as a very short, subtriangular nerve arising from the connective in the median split immediately in front of the ganglion. In the abdomen each median nerve divides into two transverse nerves which proceed outward at right angles to the vetral chain. Their distribution is shown in Pl. XI, Figs. 2, 4, 5 and 6. A cephalic branch connects with a branch of the posterior nerve of the preceding segment; a basal thread goes to the integument, and the distal portion of the nerve innervates the spiracular muscles in addition to giving one or more connections to the anterior nerve of its segment. The median nerve of the eighth ganglion, which should appear in front of the ninth if that ganglion were separate, has apparently disappeared.

The median nerves in front of the second and third thoracic ganglia give off each two pairs of transverse nerves. The second or posterior pair are really oblique in position and pass latero-caudad, eventually uniting with the median nerve of the succeeding segment. It has already been suggested that the posterior nerves of the abdominal ganglia represent these posterior branches of the thoracic median nerves, which have become fused with the ganglia and lost their original connections. The median nerve in front of the first thoracic ganglion is apparently not always present, but has been demonstrated on some specimens of both *thule* and *argenteomaculatus*. It is simple with very few fine branches and passes cephalad and ventrad to muscles at the base of the mandibles. It is possible that the minute branch, Fig. 2, "sy", represents the caudal branch of the median nerve which has degenerated and become fused with the base of the superficial nerve.

Explanation of Plate.

Plate X.

Figure 1, *S. thule*, larva,—Distribution of the brachial nerve of the 1st thoracic segment. c.gl., coxal ganglion; other lettering as on Plate XI, fig. 2.

Figure 2, *S. thule*, larva,—The under surface of the 3rd sympathetic ganglion, showing a slender attached ganglion, g.

Figure 3, *S. thule*, larva,—Distribution of branches from the median and superficial nerves of the 2nd thoracic segment to the main tracheae.

Figure 4, *S. thule*, larva,—Distribution of the labial nerve at the junction of the silk glands, a and b, ganglia arising from the labial nerve, l.n.; S. Gl., silk glands reverted; Gl., a median gland lying below the silk gland; Sp.m., muscles from the spinneret.

Figure 5, *Eacles imperialis*, larva,—The vas deferens passing through a branch of the additional nerve of the 8th segment.

Figure 6, *S. thule*, larva,—The relation of the brachial nerve of the 3rd thoracic segment with the peripheral sympathetic plexus.

Figure 7, *S. thule*, larva,—A portion of the rectal nerve arising from the lateral ganglion of the rectum, l.g.r.

Figure 8, *S. thule*, larva,—Dorsal view of brain, or supraœsophageal ganglion and its Nerves. Ant., antennal nerve; Ca. Gl., caudal ganglion; c. c., crura cerebri; Ce. Gl., cephalic ganglion; Ce. N., cephalic nerve; Fr. gl., frontal ganglion; Fr. l.g., frontal ganglion of the labral nerve; l., labral nerve; m. br., mesal branch; L. S., lateral symathetic; 1, 2, 3, its ganglia; S. ce.n., its cephalic nerve; S. l. n., its lateral nerve; m., fibres to muscles; m.gl., mesal ganglion; phbr., pharyngeal threads; p.f.g., post frontal ganglion; R.N., recurrent nerve; s. br., sympathetic branches of the labral nerve, 1 and 2; S.gl., sympathetic ganglion; tr., threads to brancheoles; Tr., a tracheal; Opt., optic nerve.

Figure 9, *S. thule*, larva,—Ventral view of the subœsophageal ganglion and its nerves. Br. N., brachial nerve; CC. crura cerebri; Li., labial nerve; l. m., l.n., strands from labral nerve; Md., mandible, and mandibular nerve; m.ex., external branch, d.br., dorsal branch, v.br., ventral branch; Mx., maxilla and maxillary nerve; s.c., subœsophageal commissure; s.gl., subœsophageal ganglion; S.g. silk gland; sp.m., muscle of spinneret; 1st Th., 1st thoracic ganglion; m., nerve fibres to muscles; mg., mesal ganglion of labial nerves.

Figure 10, *S. thule*, larva,—A general view of the nervous system.

Figure 11, *S. thule*, larva,—The alimentary canal, showing the silk gland of one side and the malpighian tubes of one side.

PLATE XI.

Figure 1, *S. thule*, larva.—The lateral sympathetic system, dorsal view. 1, 2 and 3, the three chief ganglia; Ao., aorta; Br., brain; Ce. n., cephalic nerve; L.n., lateral nerve; M. g. mesal ganglion; M.n., mesal nerve.

Figure 2, *S. thule*, larva.—Nerves from the first thoracic ganglion, (1st Th.) A., superficial nerve of the segment; B., brachial nerve, with divisions 1, 2, 3, 4 and 5; d., dorsal branch of B.1; g., lateral ganglion of ventral nerve; int., to the integument; M., to muscles; N.S. gl., nerve to silk gland; Y., recurrent branch of B.1; S., silk gland; S.gl., subœsophageal ganglion; V.N., ventral nerve.

Figure 3, *S. argenteomaculatus*, larva.—Details of the lateral sympathetic.

Figure 4, *S. thule*, larva.—The 7th and 8th abdominal Ganglia. D., the additional nerve of the 8th ganglion, representing the nerves of the 9th ganglion; l.g.r., lateral ganglion of the rectum; y., the vas deferens passing through a branch of D.; other lettering as before, see, Pl. 1, fig. 5; V. d., vas deferens.

Figure 5, *S. thule*, larva.—Nerves from the third thoracic ganglion; M., median nerve; c., caudal branch of median nerve; X., and additional thread present on the opposite side of the segment only; other lettering as in Fig. 2.

Figure 6, *S. thule*, larva.—Nerves from the first and second abdominal ganglia. Abd., 1st and 2nd., first and second abdominal ganglia; C., caudal nerve of the ganglion; Cx. branch to the proleg; F., fat body; F. nerve fibres to fat body; int., to the integument; m., to muscles; tr., to tracheae; i.f., intersegmental fold; A, superficial nerve.

(To be continued.)

BOOK REVIEW.

MANUAL OF THE ORTHOPTERA OF NEW ENGLAND, INCLUDING THE LOCUSTS, GRASSHOPPERS, CRICKETS AND THEIR ALLIES. By Albert P. Morse. Proceedings of the Boston Society of Natural History. vol. 35, No. 6, pp. 197-556, pls. 10-29, 99 text figs. April, 1920.

Even a casual inspection of this Manual leaves the impression of a work of rare quality, and a careful perusal of it only confirms and emphasizes this first impression, every page revealing the author's intimate knowledge of his subject. It is characterized not only by scientific accuracy and scholarship, but also by an attractive literary style, and is undoubtedly one of the best faunistic treatises on a group of American insects that has ever appeared.

Mr. Morse's book is the outgrowth of many years of research in field and laboratory, as everyone knows who is acquainted with his many excellent papers on the New England Orthoptera. It is by no means a mere systematic treatise, but covers a wide field, in which many matters of general biological interest are discussed.

In the introductory matter, which covers 76 pages, the author gives an interesting sketch of New England Orthopterology, an account of the principal collections of New England Orthoptera, and sections on the anatomy, habits, coloration, distribution and many other matters concerning the biology of the order. He also describes the injuries caused by locusts and other Orthoptera and the methods employed for their control, and concludes this part of the book with a very useful section giving full directions for the collection and preservation of specimens.

The general account of the habits of Orthoptera is based on those of the locusts, or short-horned grasshoppers, and is followed by a delightful description of the songs of grasshoppers and crickets and the methods by which they are produced. The next section on coloration contains much of interest. The three types of insect coloration, structural, pigmental and combinations of these, are all illustrated by species of this order, the majority being of the pigmental type. Many interesting examples of sympathetic or protective coloration are given, while the non-sympathetic coloration seen in the brightly coloured wings of the Oedipodinae, is regarded as being due, not to the phenomenon of "contrast mimicry" but as a means of signalling to other individuals of the community. Dichromatism and the varied coloration of certain species, such as the Carolina Locust, are considered to be independent of environmental coloration. The dichromatism of the Green-striped Locust is discussed in a special section by Dr. Phineas W. Whiting, who performed a series of experiments which seemed to show that temperature, and not humidity nor light, is the important factor in the colour determination of this species.

The sections entitled "Geographical Distribution" and "Colonization of New England—Dispersal Routes" are particularly excellent. In the former various faunal zones are characterized and their boundaries within the New England States clearly defined, and the characteristic species of Orthoptera inhabiting each are enumerated. Local distribution is also discussed and the author's well-known classification of locust habitats is introduced in illustration of this subject. Following this section is one on "Wingless and Vestigial-winged Orthoptera," in which the author's views on wing-length as a habitat relation are quoted from a former publication (Publ. 18, Carnegie Inst. Wash.).

The economic aspect of the subject is treated at considerable length in three sections dealing with the injuries of locusts and other Orthoptera in New England, remedies against locusts and earwigs, and natural enemies, including bacterial and fungus diseases, parasites, such as hair-worms, mites and tachinid flies, predaceous insects, amphibians, snakes and birds. Remedies against cockroaches are dealt with under the general account of the Blattidae in the special part of the volume.

In this second part, which deals with the classification and description of the various species, the same high standard of excellence is maintained, and the descriptive matter is relieved of the dryness usually characteristic of systematic works by the many vivid word-pictures of the habits and environmental relations of the different species. The author is wisely conservative in following a system of classification that has long been in general use, and in introducing

no changes of nomenclature. The placing of the family Phasmidae, a very isolated group, between the nearly related families Blattidae and Mantidae is the only point we would criticise in this connection, but the matter is of little consequence in a work of this character.

Of the 132 species of Dermaptera and Orthoptera recorded from New England no less than 28 species are introduced forms, among which are 5 species of earwigs, 14 of cockroaches, 3 mantids (none of which are established) and 6 saltatorial species.

The illustrations are well chosen and the three original coloured plates deserve special mention on account of the truthfulness of the figures in both form and colour.

Mr. Morse's book is a fine model for systematic workers to emulate and should rank as a classic in American entomology. E. M. W.

ERRATA.

For *Gunthrop* read *Gunthorp*, p. 112, line 14.

For *megachile* read *Megachile*, p. 119, lines 5 and 18.

For *argentate* read *argentata*, p. 119, line 11.

For *Tohitic* read *Tahiti*, p. 119, line 16.

For *Tahihan* read *Tahitan*, p. 119, line 17.

For *Trachea fanitima* read *finitima*, p. 121, line 18.

For *Mecistophalidæ* read *Mecistocephalidæ*, p. 184, line 11.

For *Urocerous* read *Urocerus*, p. 216, line 13.

For *flavcornis* read *flavicornis*, p. 216, line 6 from bottom.

CHANGE OF ADDRESS.

The Rev. Professor C. J. S. Bethune has left Guelph and is now residing at Toronto. His present address is as follows:

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